FIG.1

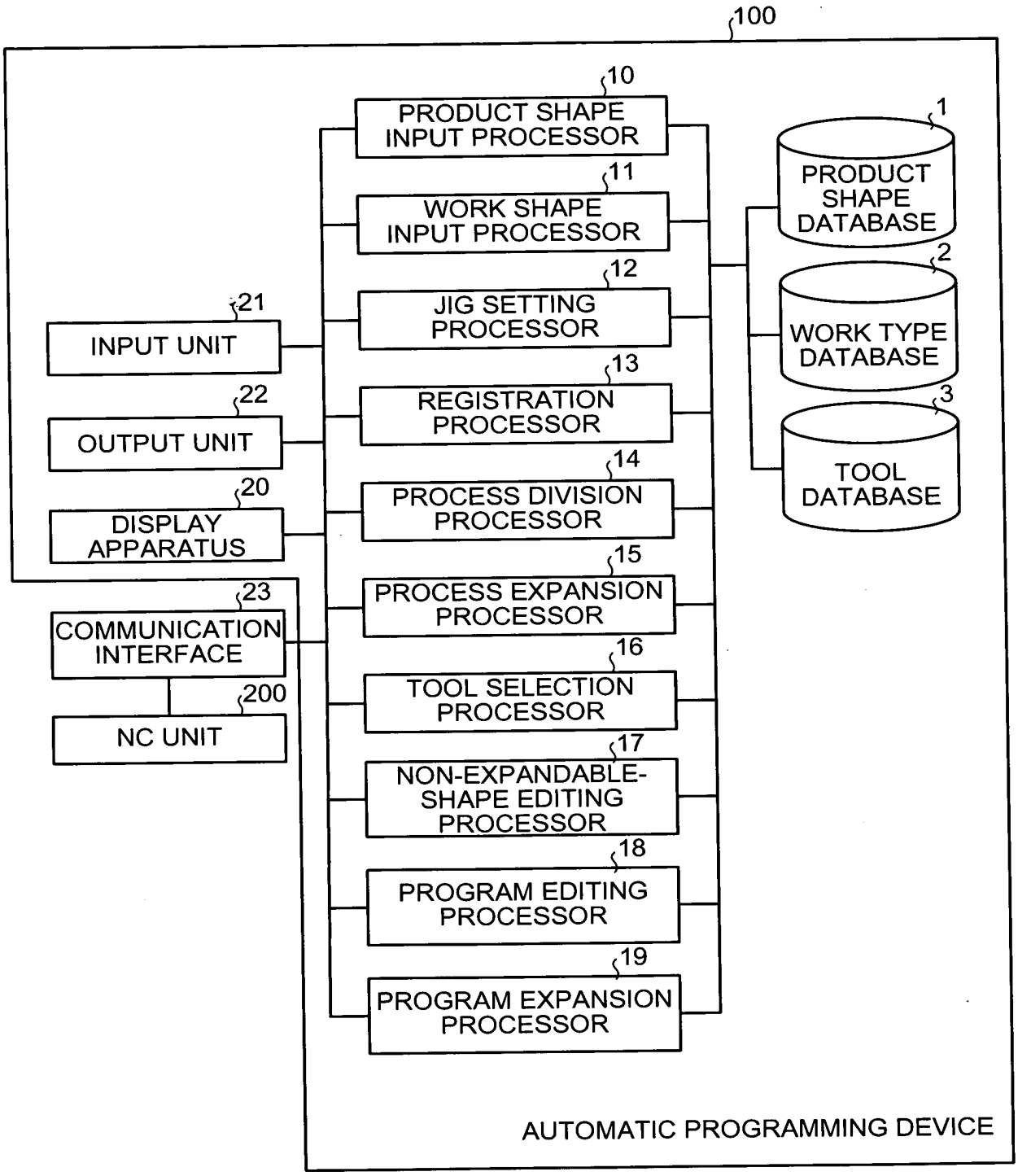

100
10
PRODUCT SHAPE INPUT PROCESSOR
11
WORK SHAPE INPUT PROCESSOR
12
JIG SETTING PROCESSOR
13
REGISTRATION PROCESSOR
14
PROCESS DIVISION PROCESSOR
15
PROCESS EXPANSION PROCESSOR
16
TOOL SELECTION PROCESSOR
17
NON-EXPANDABLE-SHAPE EDITING PROCESSOR
18
PROGRAM EDITING PROCESSOR
19
PROGRAM EXPANSION PROCESSOR
1
PRODUCT SHAPE DATABASE
2
WORK TYPE DATABASE
3
TOOL DATABASE
21
INPUT UNIT
22
OUTPUT UNIT
20
DISPLAY APPARATUS
23
COMMUNICATION INTERFACE
200
NC UNIT
AUTOMATIC PROGRAMMING DEVICE

FIG.2

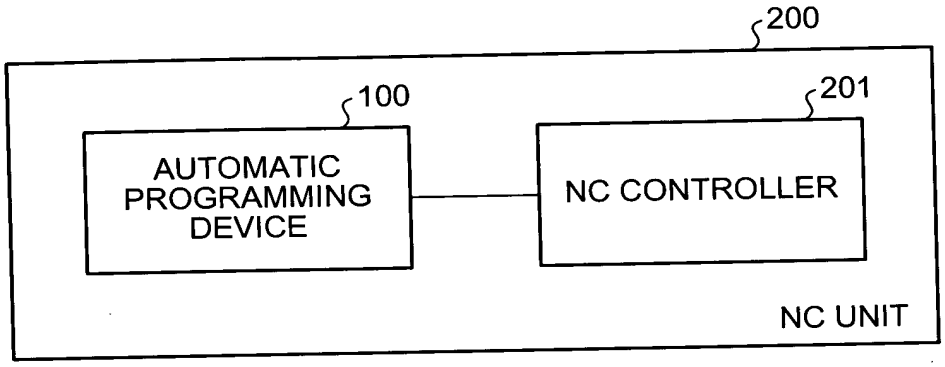

200
100
201
AUTOMATIC PROGRAMMING DEVICE
NC CONTROLLER
NC UNIT

FIG.3

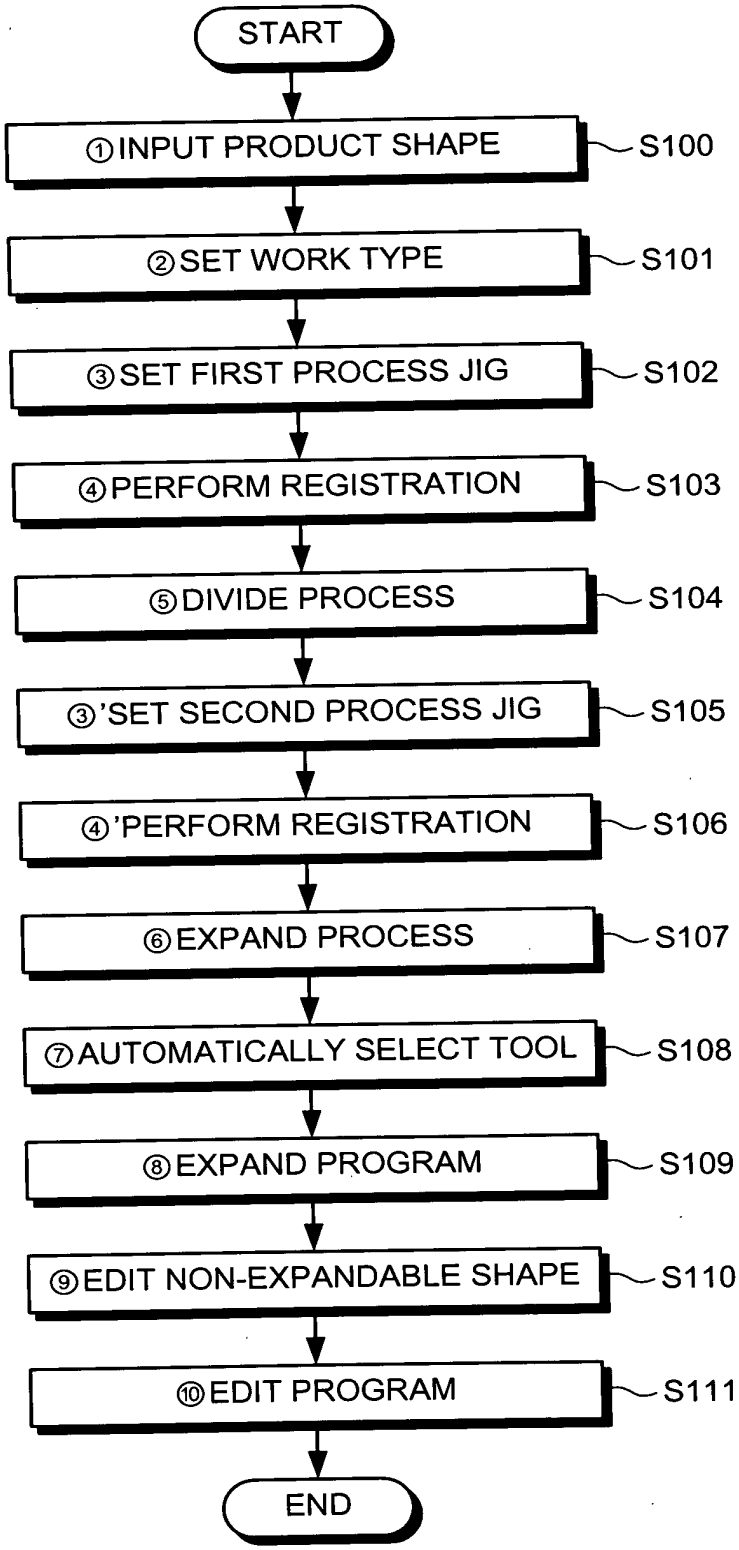

START
①INPUT PRODUCT SHAPE
S100
②SET WORK TYPE
S101
③SET FIRST PROCESS JIG
S102
④PERFORM REGISTRATION
S103
⑤DIVIDE PROCESS
S104
③'SET SECOND PROCESS JIG
S105
④'PERFORM REGISTRATION
S106
⑥EXPAND PROCESS
S107
⑦AUTOMATICALLY SELECT TOOL
S108
⑧EXPAND PROGRAM
S109
⑨EDIT NON-EXPANDABLE SHAPE
S110
⑩EDIT PROGRAM
S111
END

FIG.4

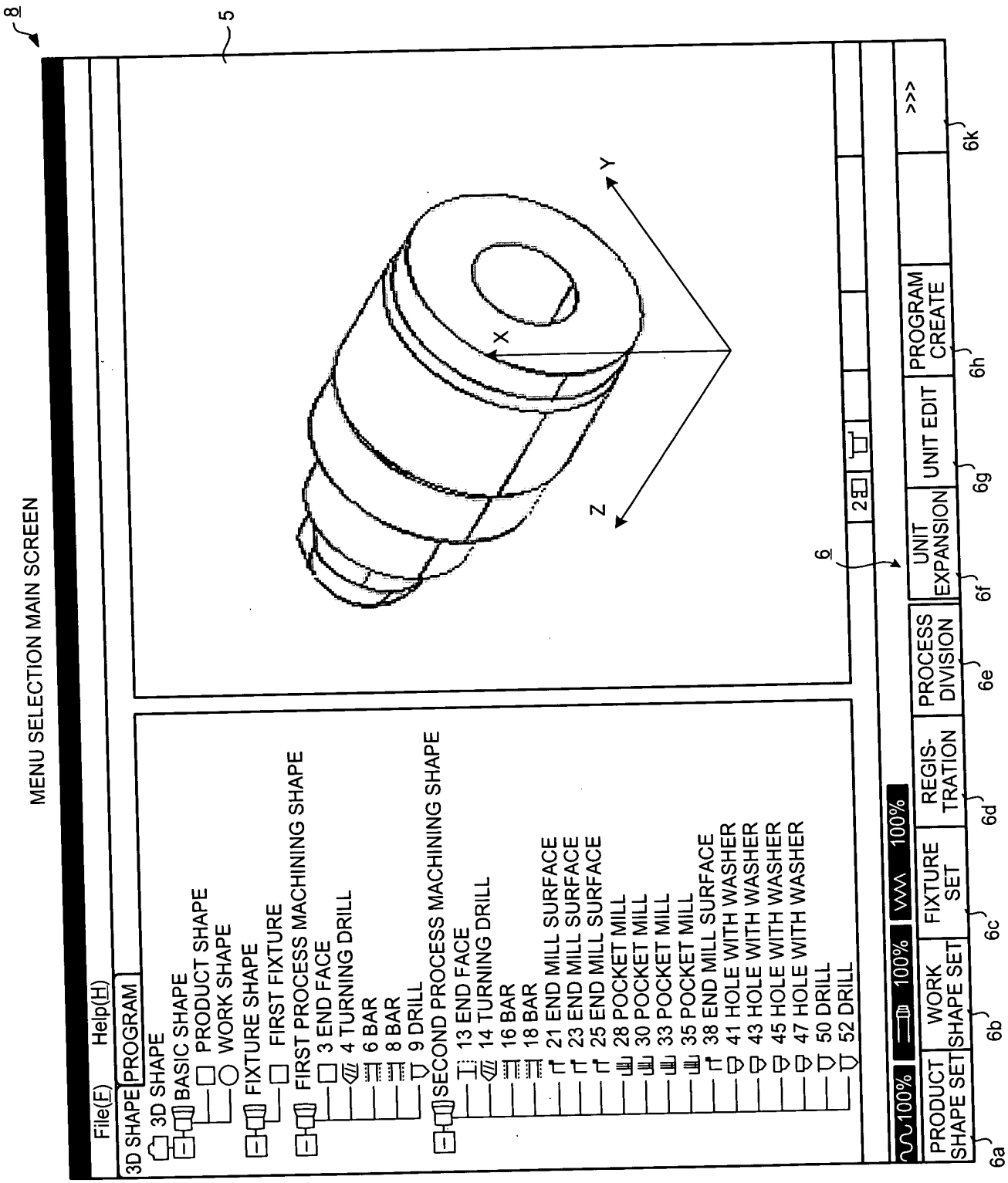

8
MENU SELECTION MAIN SCREEN
5
File(F)
Help(H)
3D SHAPE
PROGRAM
3D SHAPE
BASIC SHAPE
PRODUCT SHAPE
WORK SHAPE
FIXTURE SHAPE
FIRST FIXTURE
FIRST PROCESS MACHINING SHAPE
3 END FACE
4 TURNING DRILL
6 BAR
8 BAR
9 DRILL
SECOND PROCESS MACHINING SHAPE
13 END FACE
14 TURNING DRILL
16 BAR
18 BAR
21 END MILL SURFACE
23 END MILL SURFACE
25 END MILL SURFACE
28 POCKET MILL
30 POCKET MILL
33 POCKET MILL
35 POCKET MILL
38 END MILL SURFACE
41 HOLE WITH WASHER
43 HOLE WITH WASHER
45 HOLE WITH WASHER
47 HOLE WITH WASHER
50 DRILL
52 DRILL
X
Y
Z
6
2
100%
100%
100%
PRODUCT SHAPE SET
WORK SHAPE SET
FIXTURE SET
REGIS-TRATION
PROCESS DIVISION
UNIT EXPANSION
UNIT EDIT
PROGRAM CREATE
>>>
6a
6b
6c
6d
6e
6f
6g
6h
6k

FIG.5

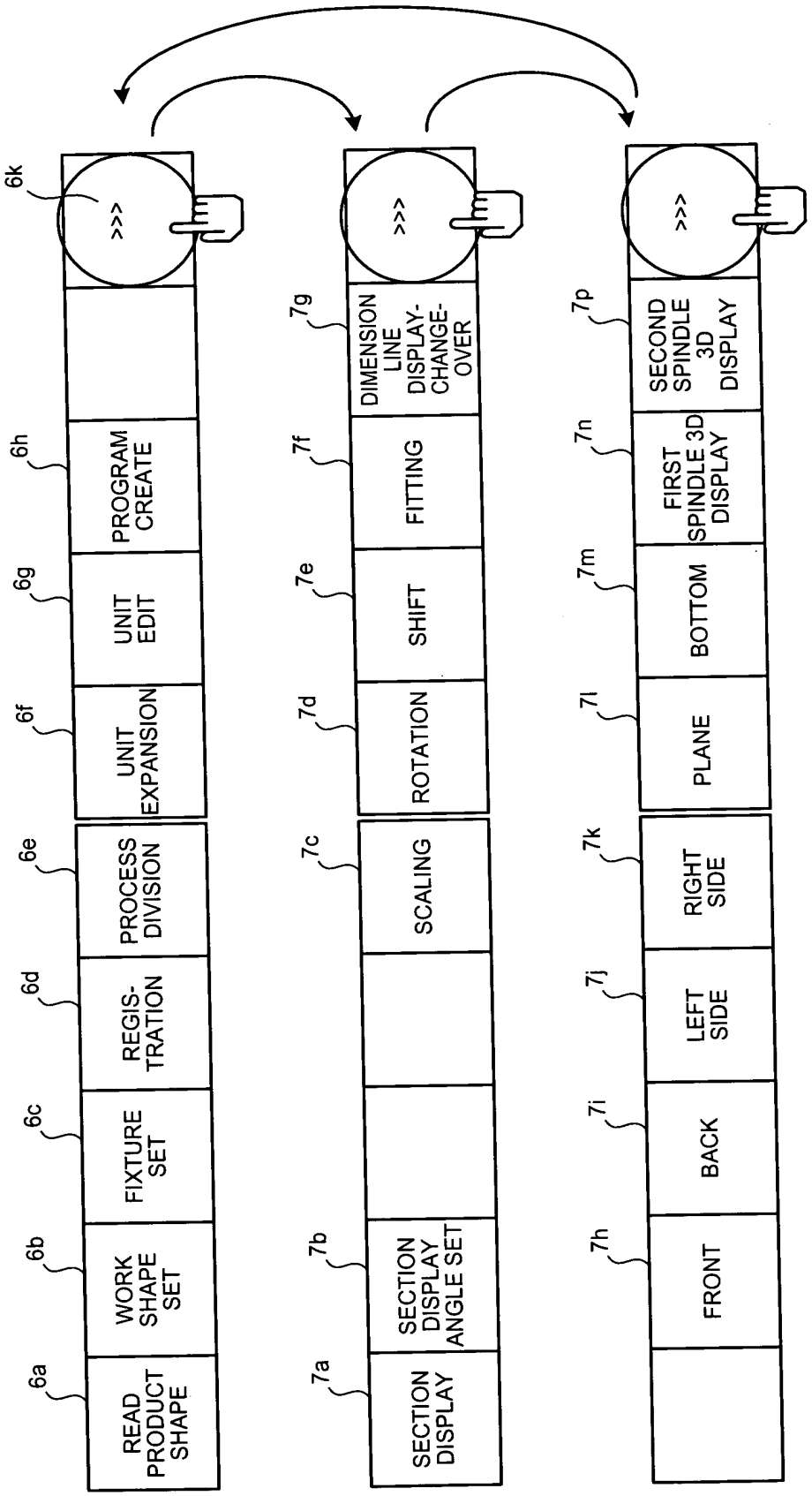

6k
>>>
6h
PROGRAM CREATE
6g
UNIT EDIT
6f
UNIT EXPANSION
6e
PROCESS DIVISION
6d
REGIS-TRATION
6c
FIXTURE SET
6b
WORK SHAPE SET
6a
READ PRODUCT SHAPE
7g
DIMENSION LINE DISPLAY-CHANGE-OVER
7f
FITTING
7e
SHIFT
7d
ROTATION
7c
SCALING
7b
SECTION DISPLAY ANGLE SET
7a
SECTION DISPLAY
7p
SECOND SPINDLE 3D DISPLAY
7n
FIRST SPINDLE 3D DISPLAY
7m
BOTTOM
7l
PLANE
7k
RIGHT SIDE
7j
LEFT SIDE
7i
BACK
7h
FRONT

FIG.6

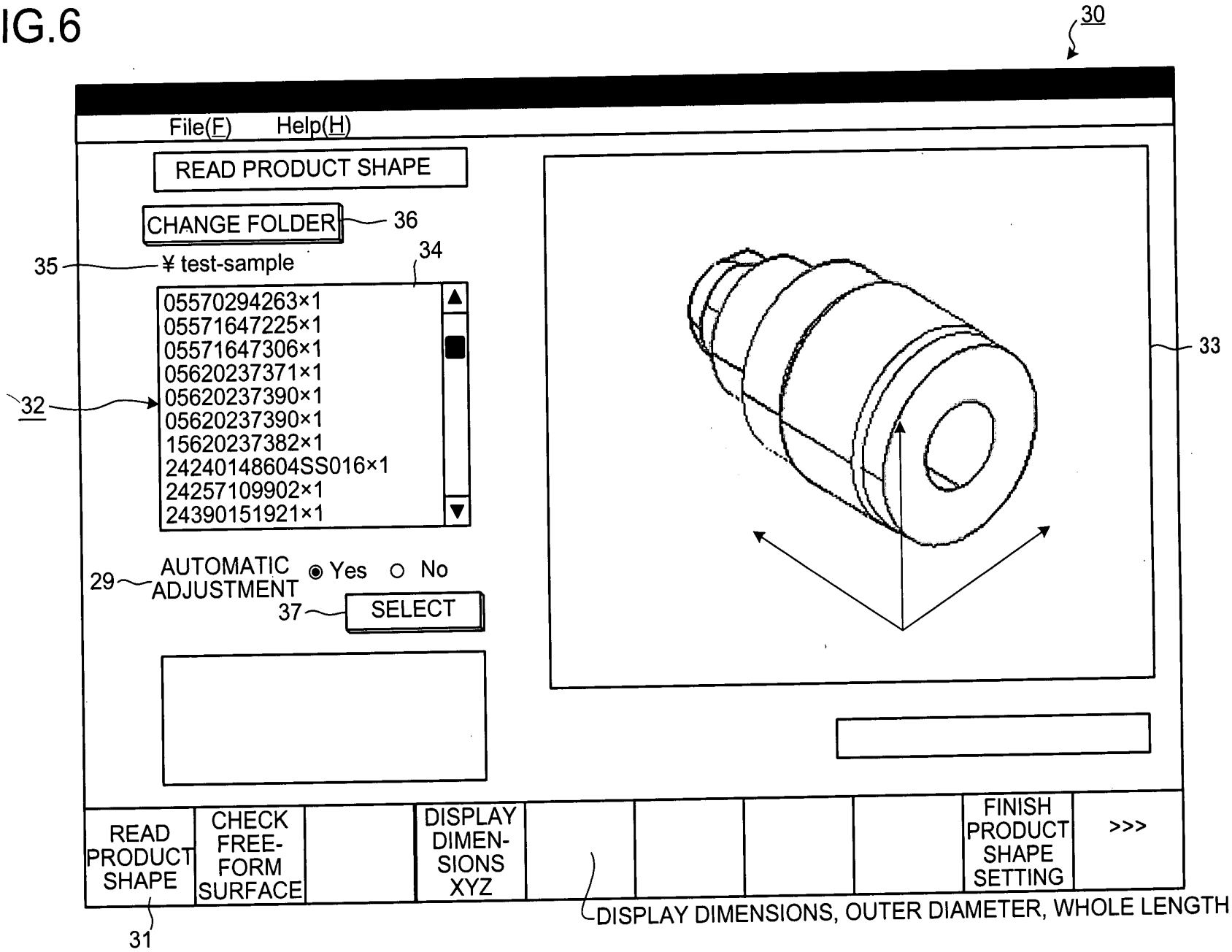


FIG.7

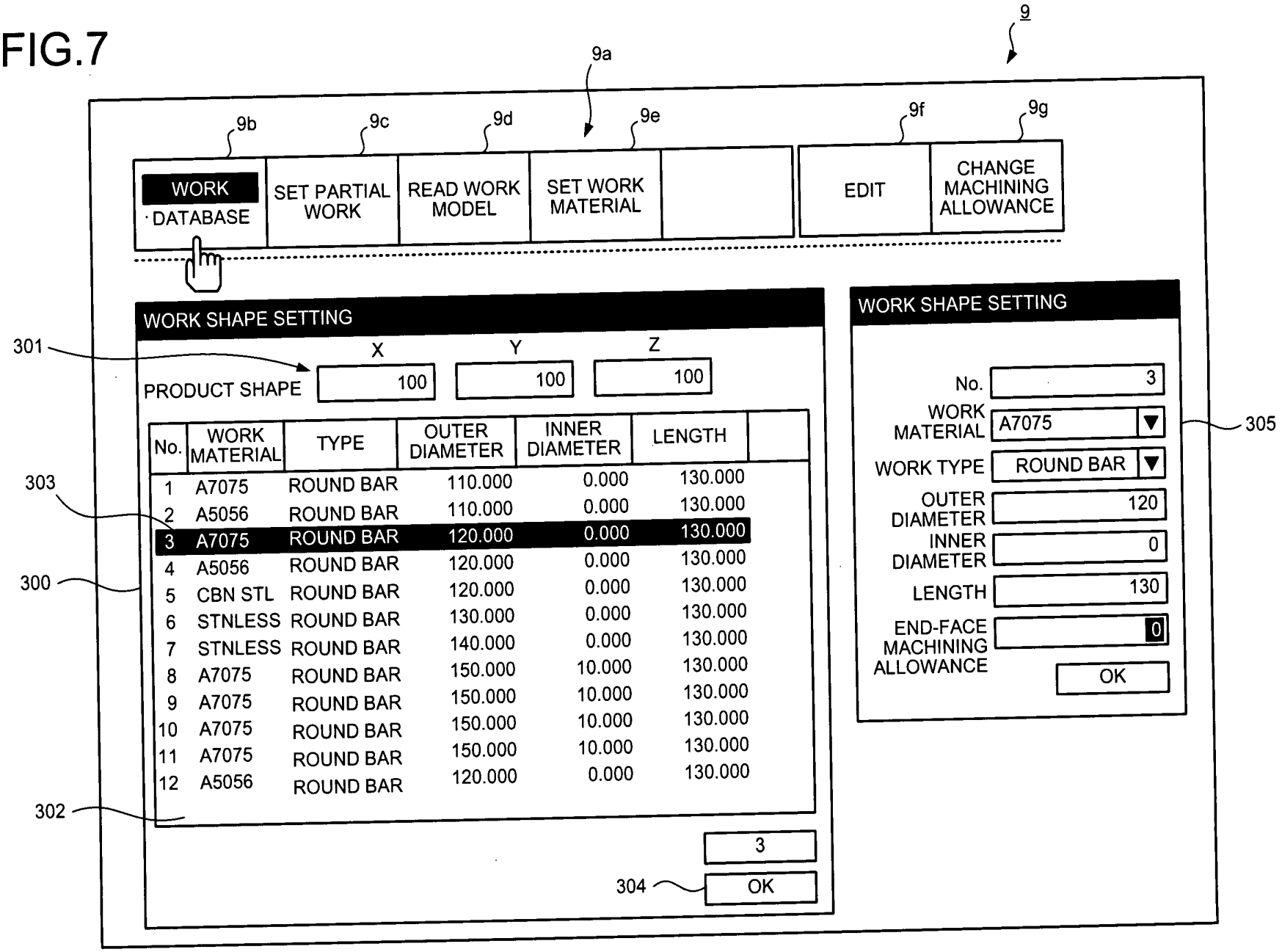


FIG.8

WORK SHAPE

MATERIAL	TYPE	OUTER DIAMETER	INNER DIAMETER	. . . .
CBN STL	Cylinder	250	20	
CBN STL	Cylinder	250	30	
CBN STL	Cylinder	250	40	
CBN STL	Cylinder	250	50	
CBN STL	Cylinder	400		
CBN STL	Cylinder	400	30	
CBN STL	Cylinder	500		
CBN STL	Cylinder	800	70	
CBN STL	Cylinder	800	100	
CBN STL	Hexagon	300		
CBN STL	Hexagon	300		
CBN STL	Hexagon	400		

FIG.9

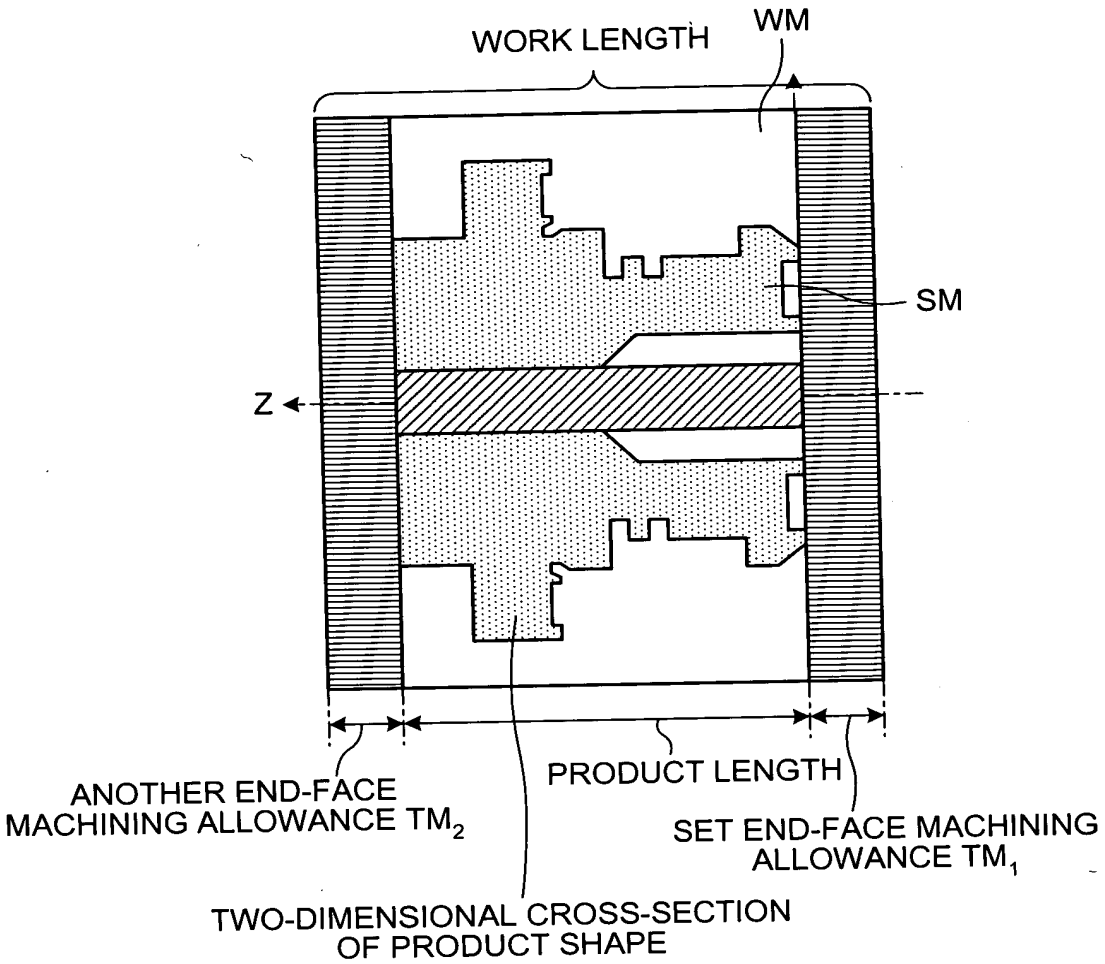

WORK LENGTH
WM
SM
Z
ANOTHER END-FACE MACHINING ALLOWANCE TM_2
PRODUCT LENGTH
SET END-FACE MACHINING ALLOWANCE TM_1
TWO-DIMENSIONAL CROSS-SECTION OF PRODUCT SHAPE

FIG.10

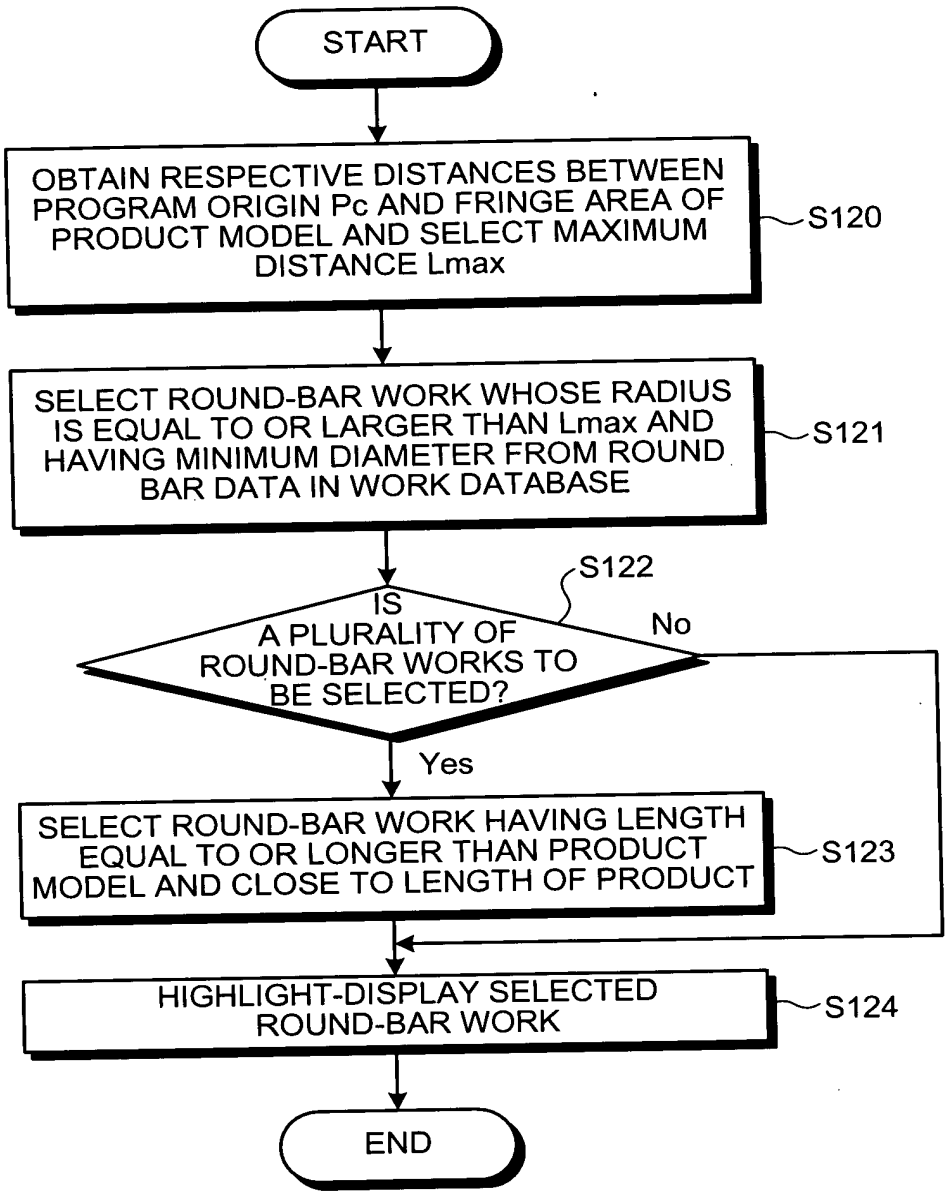

START
OBTAIN RESPECTIVE DISTANCES BETWEEN PROGRAM ORIGIN Pc AND FRINGE AREA OF PRODUCT MODEL AND SELECT MAXIMUM DISTANCE Lmax
S120
SELECT ROUND-BAR WORK WHOSE RADIUS IS EQUAL TO OR LARGER THAN Lmax AND HAVING MINIMUM DIAMETER FROM ROUND BAR DATA IN WORK DATABASE
S121
S122
IS A PLURALITY OF ROUND-BAR WORKS TO BE SELECTED?
No
Yes
SELECT ROUND-BAR WORK HAVING LENGTH EQUAL TO OR LONGER THAN PRODUCT MODEL AND CLOSE TO LENGTH OF PRODUCT
S123
HIGHLIGHT-DISPLAY SELECTED ROUND-BAR WORK
S124
END

FIG. 11

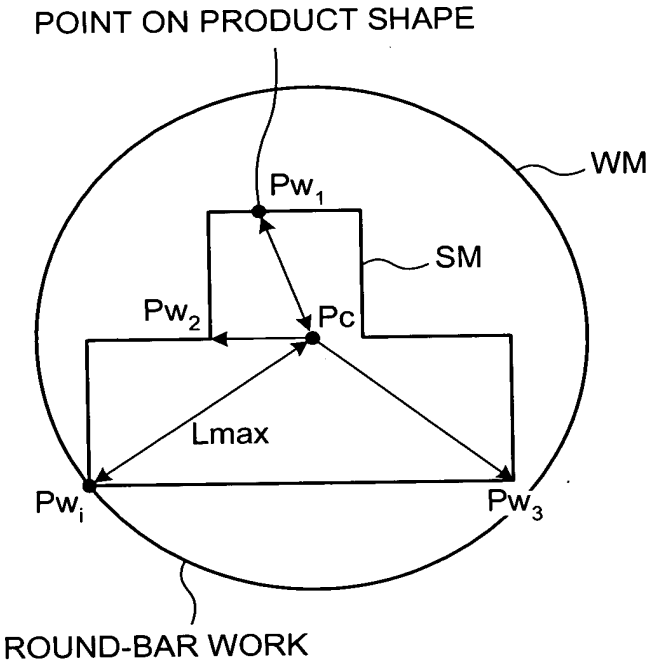

POINT ON PRODUCT SHAPE
WM
Pw_1
SM
Pw_2
Pc
Lmax
Pw_i
Pw_3
ROUND-BAR WORK

FIG.12

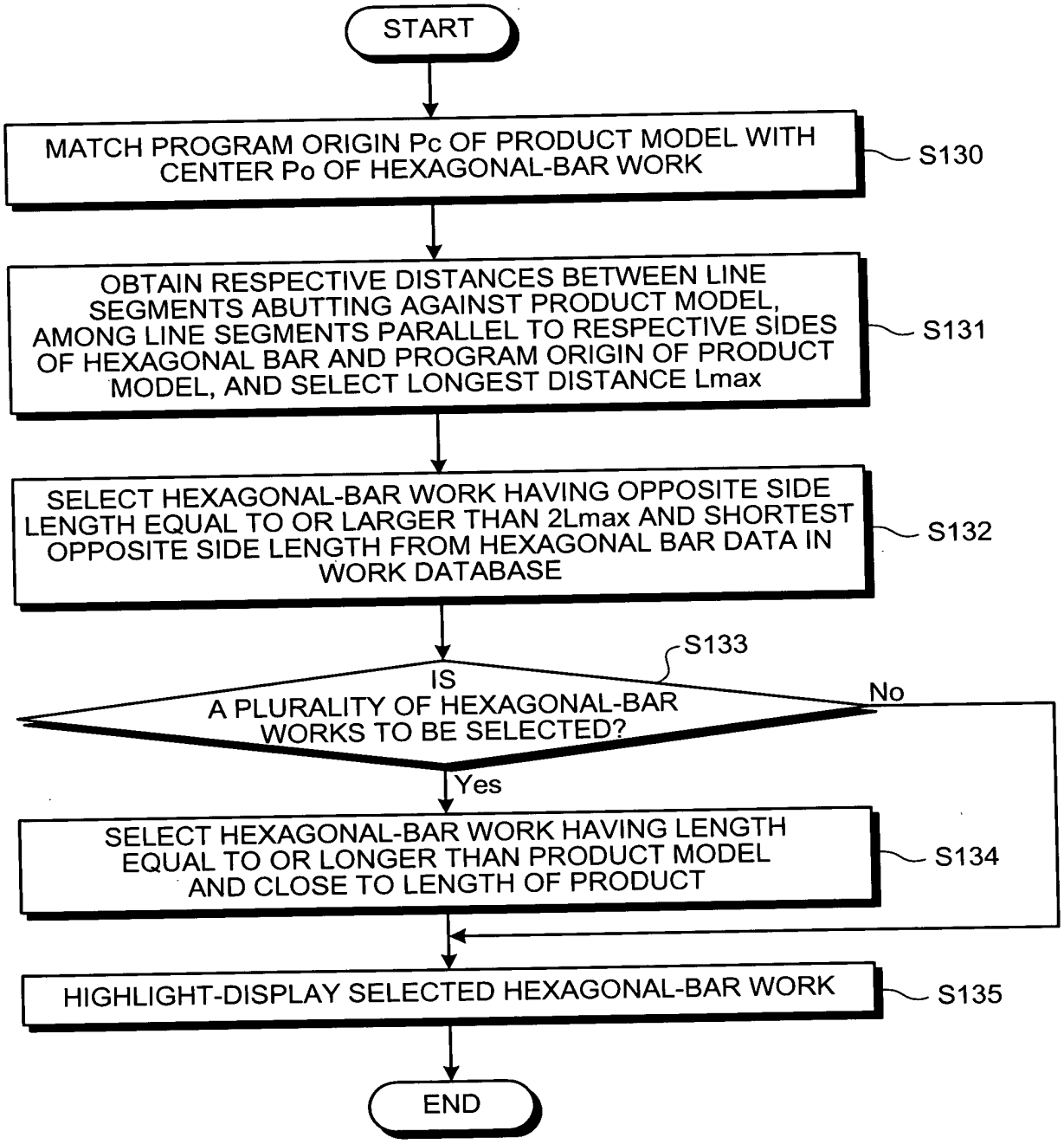

START
MATCH PROGRAM ORIGIN Pc OF PRODUCT MODEL WITH CENTER Po OF HEXAGONAL-BAR WORK
S130
OBTAIN RESPECTIVE DISTANCES BETWEEN LINE SEGMENTS ABUTTING AGAINST PRODUCT MODEL, AMONG LINE SEGMENTS PARALLEL TO RESPECTIVE SIDES OF HEXAGONAL BAR AND PROGRAM ORIGIN OF PRODUCT MODEL, AND SELECT LONGEST DISTANCE Lmax
S131
SELECT HEXAGONAL-BAR WORK HAVING OPPOSITE SIDE LENGTH EQUAL TO OR LARGER THAN 2Lmax AND SHORTEST OPPOSITE SIDE LENGTH FROM HEXAGONAL BAR DATA IN WORK DATABASE
S132
S133
IS A PLURALITY OF HEXAGONAL-BAR WORKS TO BE SELECTED?
No
Yes
SELECT HEXAGONAL-BAR WORK HAVING LENGTH EQUAL TO OR LONGER THAN PRODUCT MODEL AND CLOSE TO LENGTH OF PRODUCT
S134
HIGHLIGHT-DISPLAY SELECTED HEXAGONAL-BAR WORK
S135
END

FIG.13

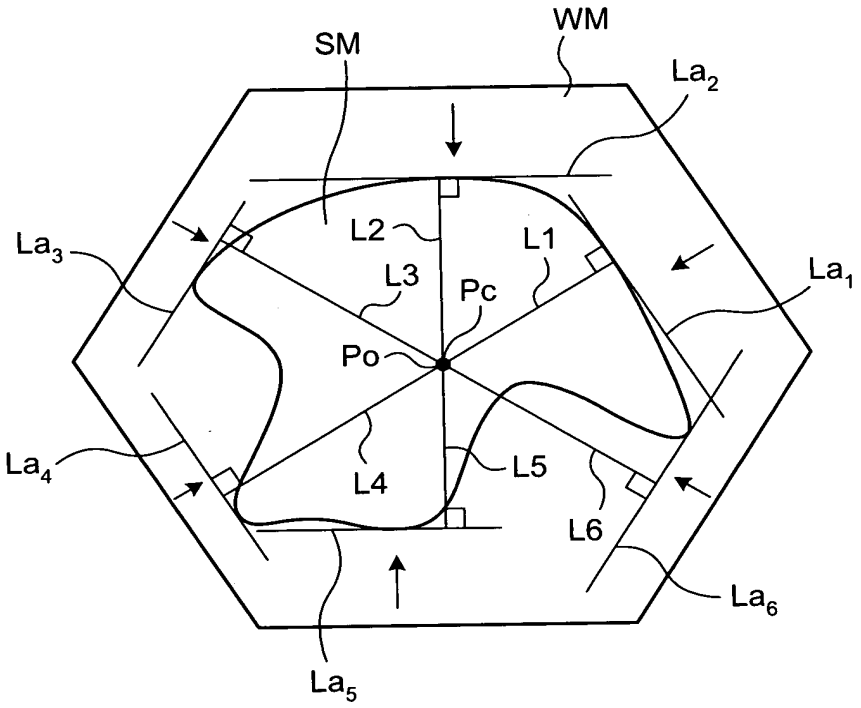


FIG.14

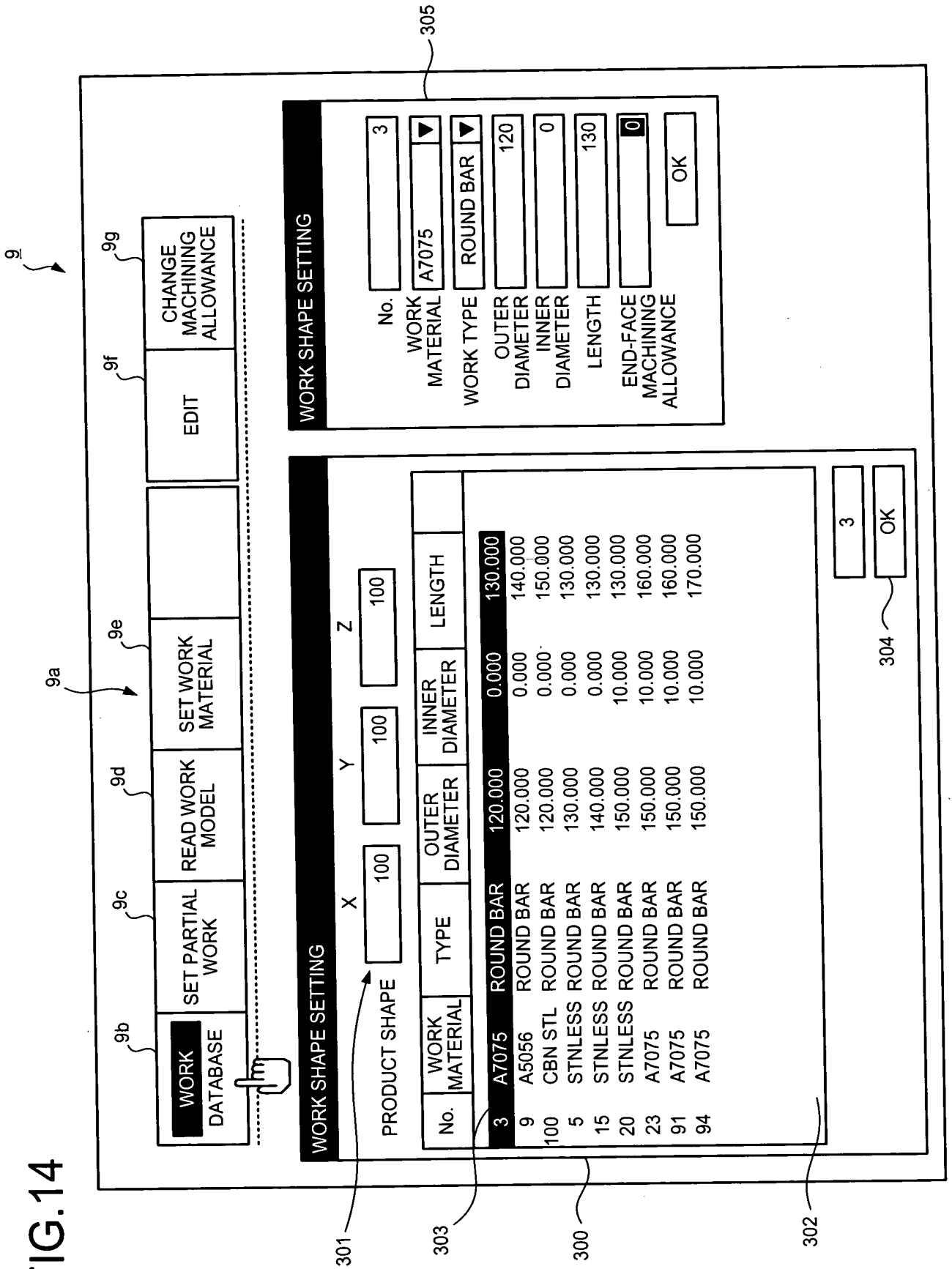

9
9a
9b
WORK DATABASE
9c
SET PARTIAL WORK
9d
READ WORK MODEL
9e
SET WORK MATERIAL
9f
EDIT
9g
CHANGE MACHINING ALLOWANCE
305
WORK SHAPE SETTING
No. 3
WORK MATERIAL A7075
WORK TYPE ROUND BAR
OUTER DIAMETER 120
INNER DIAMETER 0
LENGTH 130
END-FACE MACHINING ALLOWANCE 0
OK
WORK SHAPE SETTING
PRODUCT SHAPE
X 100
Y 100
Z 100
No. | WORK MATERIAL | TYPE | OUTER DIAMETER | INNER DIAMETER | LENGTH
3 A7075 ROUND BAR 120.000 0.000 130.000
9 A5056 ROUND BAR 120.000 0.000 140.000
100 CBN STL ROUND BAR 120.000 0.000 150.000
5 STNLESS ROUND BAR 130.000 0.000 130.000
15 STNLESS ROUND BAR 140.000 0.000 130.000
20 STNLESS ROUND BAR 150.000 10.000 130.000
23 A7075 ROUND BAR 150.000 10.000 160.000
91 A7075 ROUND BAR 150.000 10.000 160.000
94 A7075 ROUND BAR 150.000 10.000 170.000
3
OK
304
301
303
300
302

FIG.15

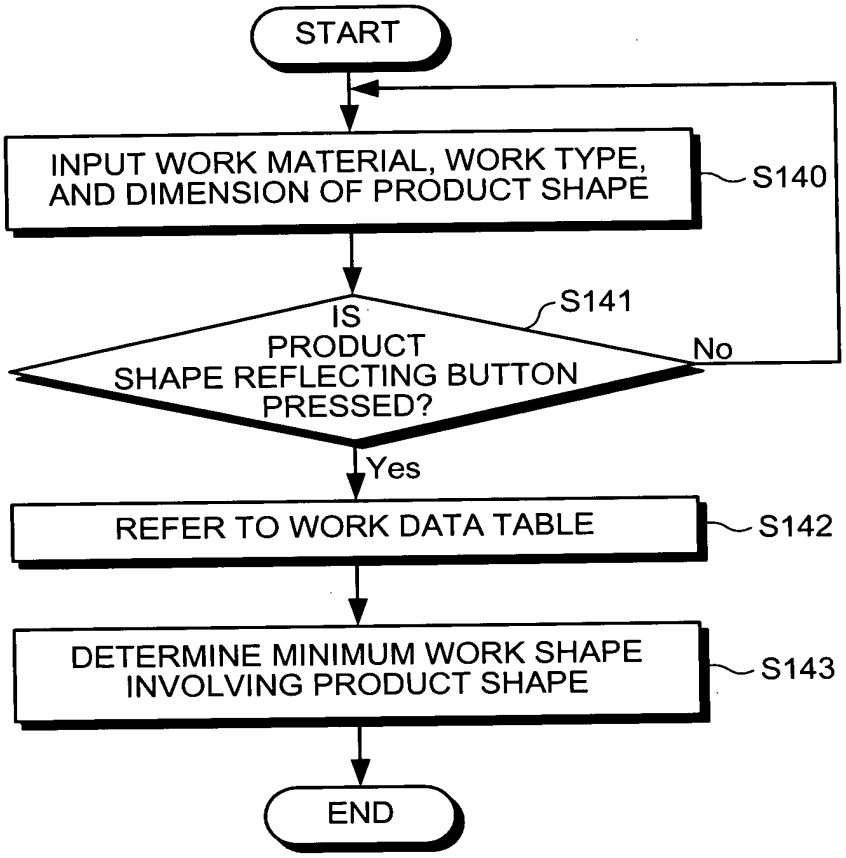

START
INPUT WORK MATERIAL, WORK TYPE, AND DIMENSION OF PRODUCT SHAPE
S140
IS PRODUCT SHAPE REFLECTING BUTTON PRESSED?
S141
No
Yes
REFER TO WORK DATA TABLE
S142
DETERMINE MINIMUM WORK SHAPE INVOLVING PRODUCT SHAPE
S143
END

FIG.16

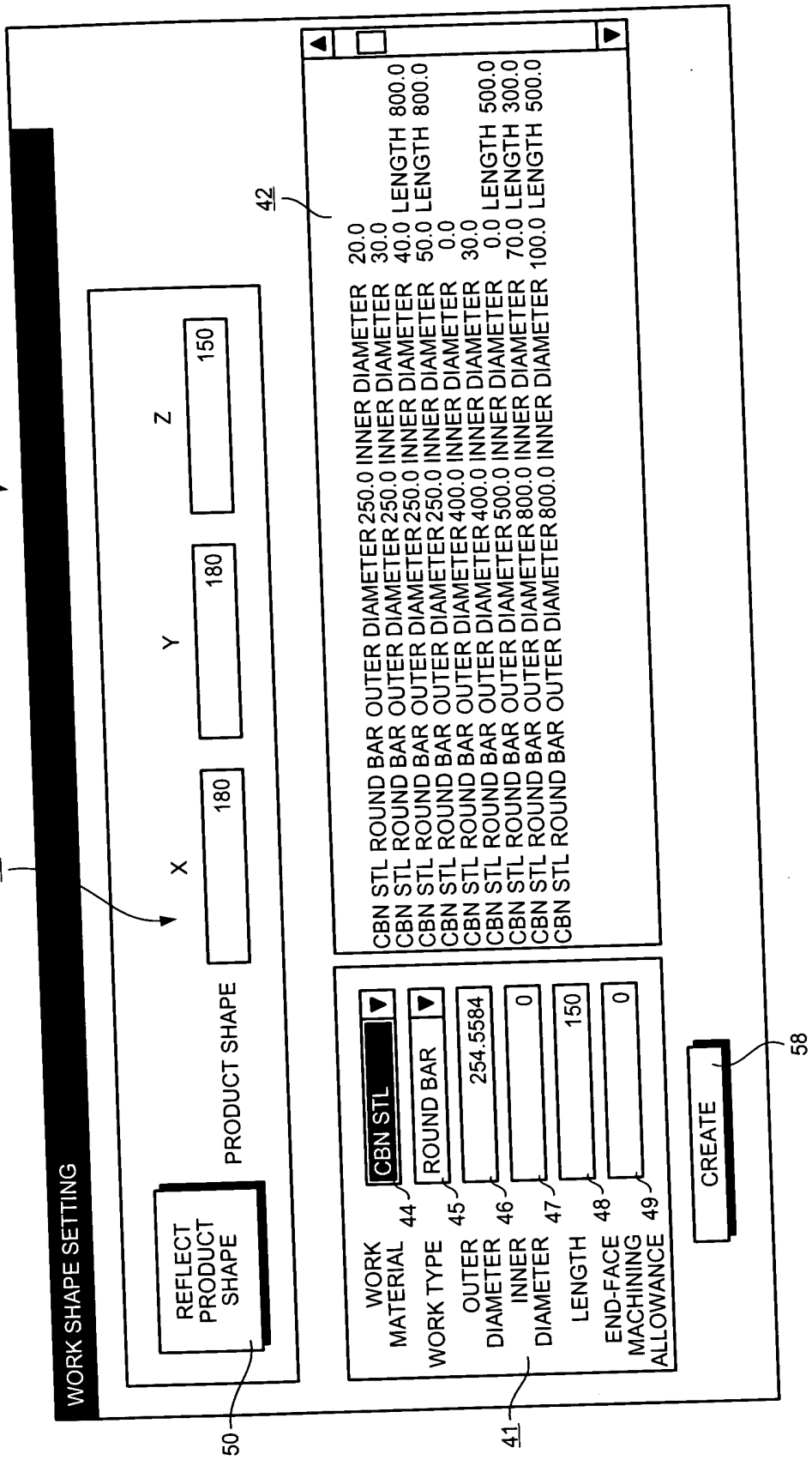

40
WORK SHAPE SETTING
43
X
180
Y
180
Z
150
PRODUCT SHAPE
REFLECT PRODUCT SHAPE
50
42
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 20.0
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 30.0
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 40.0 LENGTH 800.0
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 50.0 LENGTH 800.0
CBN STL ROUND BAR OUTER DIAMETER 400.0 INNER DIAMETER 0.0
CBN STL ROUND BAR OUTER DIAMETER 400.0 INNER DIAMETER 30.0
CBN STL ROUND BAR OUTER DIAMETER 500.0 INNER DIAMETER 0.0 LENGTH 500.0
CBN STL ROUND BAR OUTER DIAMETER 800.0 INNER DIAMETER 70.0 LENGTH 300.0
CBN STL ROUND BAR OUTER DIAMETER 800.0 INNER DIAMETER 100.0 LENGTH 500.0
WORK MATERIAL
44
CBN STL
WORK TYPE
45
ROUND BAR
OUTER DIAMETER
46
254.5584
INNER DIAMETER
47
0
LENGTH
48
150
END-FACE MACHINING ALLOWANCE
49
0
CREATE
58
41

FIG.17

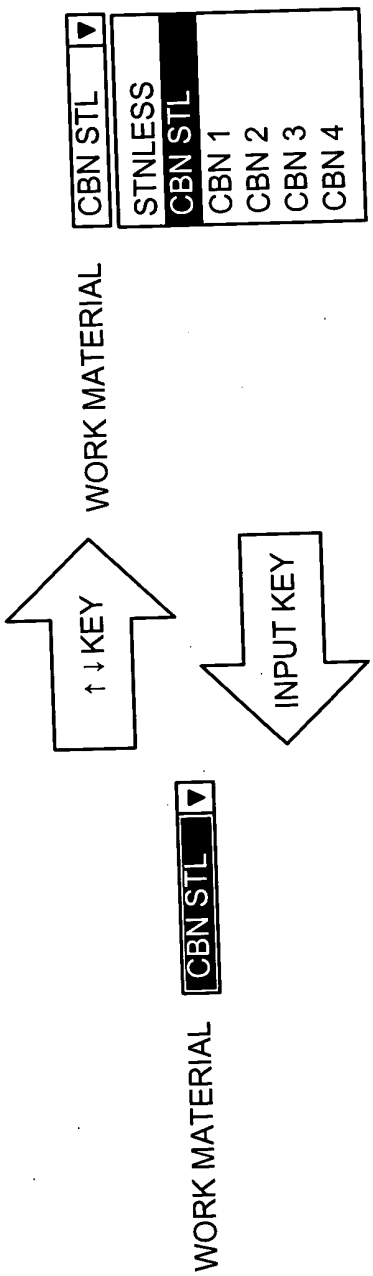

CBN STL
STNLESS
CBN STL
CBN 1
CBN 2
CBN 3
CBN 4
WORK MATERIAL
↑↓KEY
INPUT KEY
CBN STL
WORK MATERIAL

FIG.18

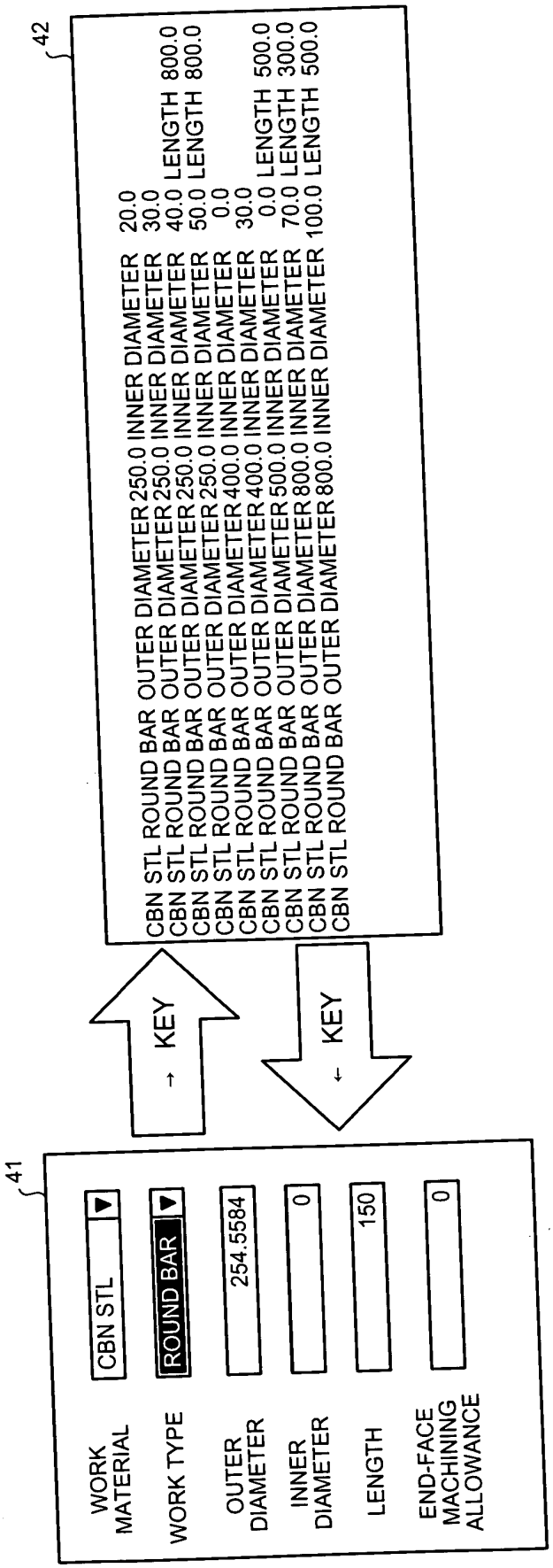

42
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 20.0
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 30.0
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 40.0 LENGTH 800.0
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 50.0 LENGTH 800.0
CBN STL ROUND BAR OUTER DIAMETER 250.0 INNER DIAMETER 0.0
CBN STL ROUND BAR OUTER DIAMETER 400.0 INNER DIAMETER 30.0
CBN STL ROUND BAR OUTER DIAMETER 500.0 INNER DIAMETER 0.0 LENGTH 500.0
CBN STL ROUND BAR OUTER DIAMETER 800.0 INNER DIAMETER 70.0 LENGTH 300.0
CBN STL ROUND BAR OUTER DIAMETER 800.0 INNER DIAMETER 100.0 LENGTH 500.0
CBN STL ROUND BAR OUTER DIAMETER 800.0 INNER DIAMETER 800.0 LENGTH 500.0
↑ KEY
↓ KEY
41
WORK MATERIAL
CBN STL
WORK TYPE
ROUND BAR
OUTER DIAMETER
254.5584
INNER DIAMETER
0
LENGTH
150
END-FACE MACHINING ALLOWANCE
0

FIG.19

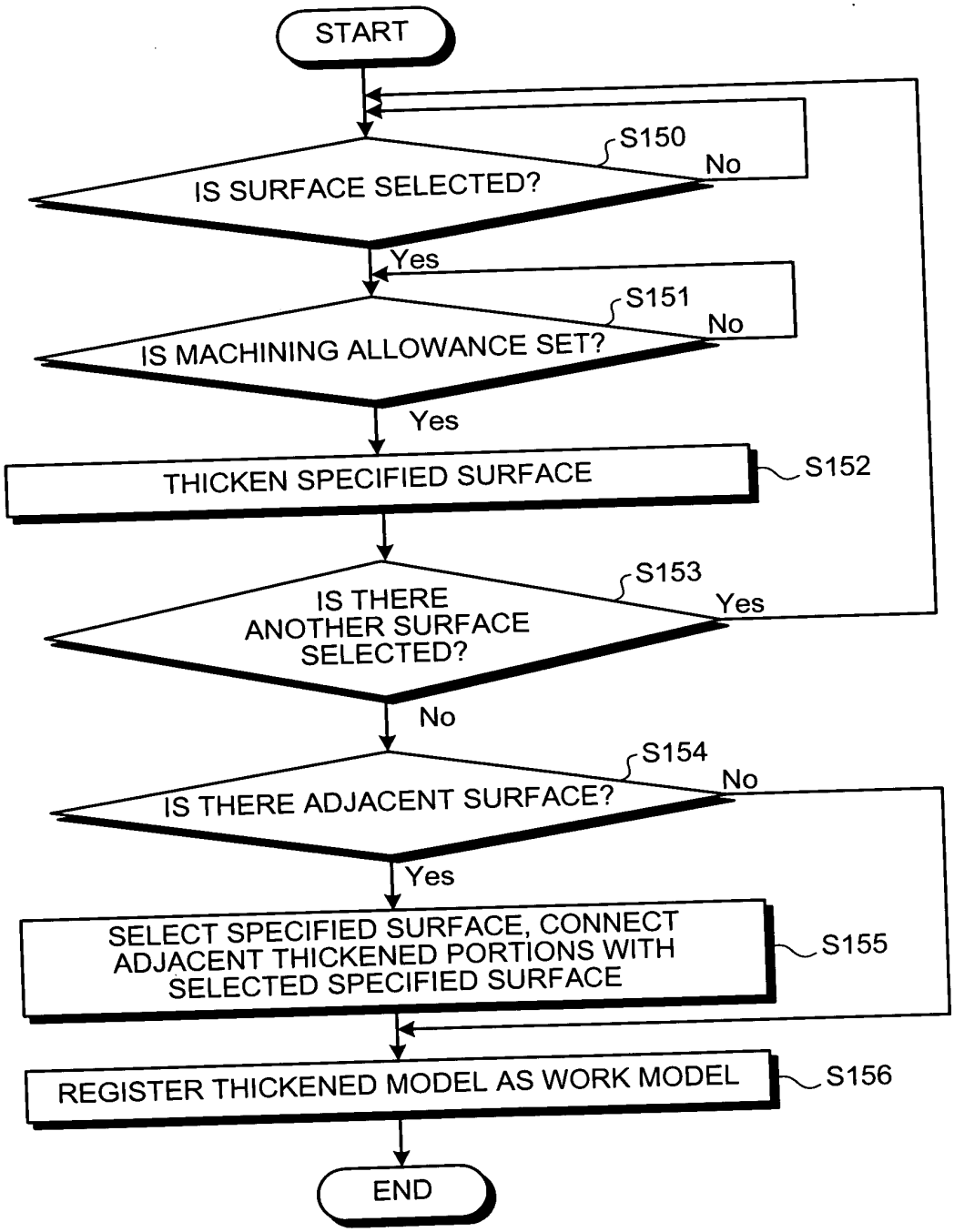

START
S150
IS SURFACE SELECTED?
No
Yes
S151
IS MACHINING ALLOWANCE SET?
No
Yes
THICKEN SPECIFIED SURFACE
S152
S153
IS THERE ANOTHER SURFACE SELECTED?
Yes
No
S154
IS THERE ADJACENT SURFACE?
No
Yes
SELECT SPECIFIED SURFACE, CONNECT ADJACENT THICKENED PORTIONS WITH SELECTED SPECIFIED SURFACE
S155
REGISTER THICKENED MODEL AS WORK MODEL
S156
END

FIG.20

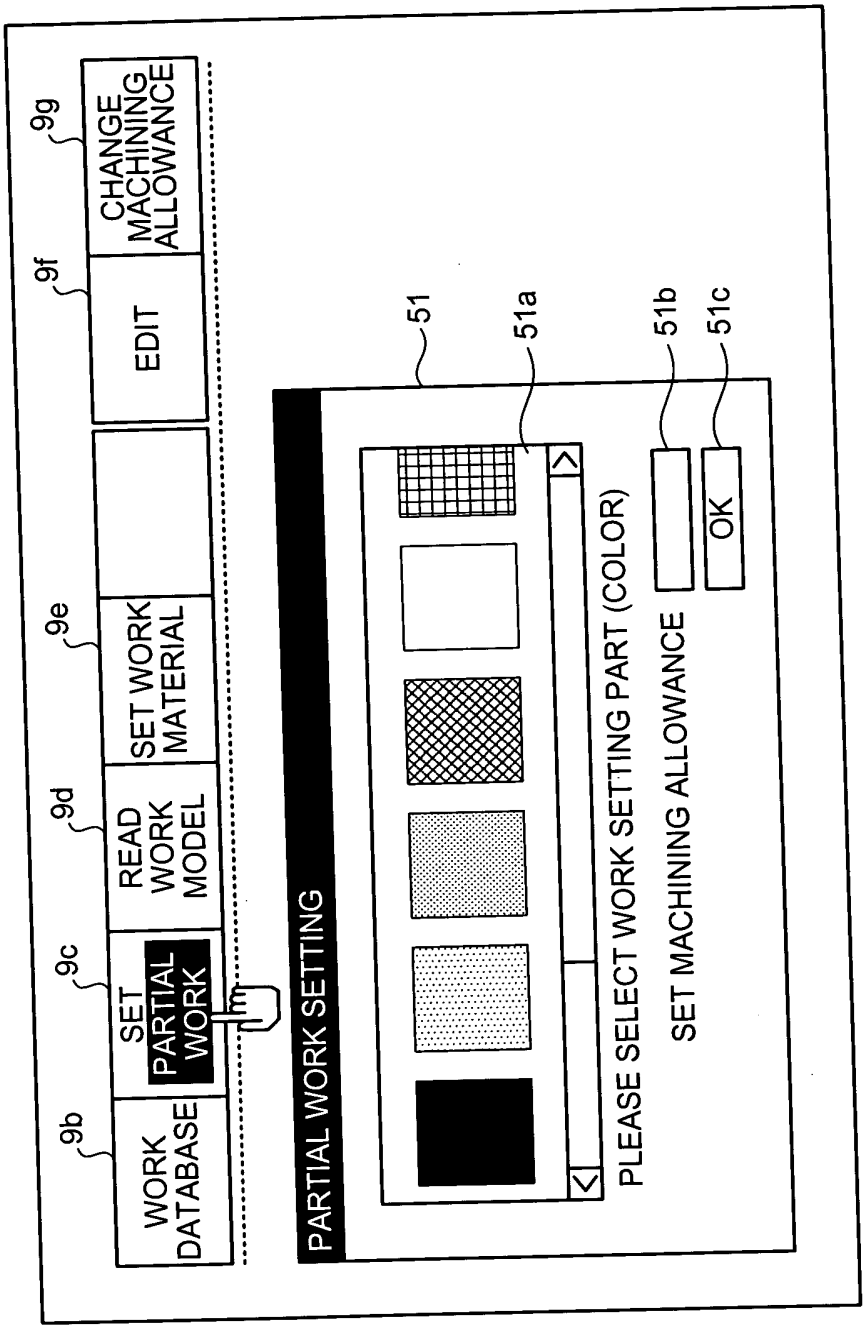

WORK DATABASE
9b
SET PARTIAL WORK
9c
READ WORK MODEL
9d
SET WORK MATERIAL
9e
EDIT
9f
CHANGE MACHINING ALLOWANCE
9g
PARTIAL WORK SETTING
51
51a
51b
51c
PLEASE SELECT WORK SETTING PART (COLOR)
SET MACHINING ALLOWANCE
OK

FIG.21

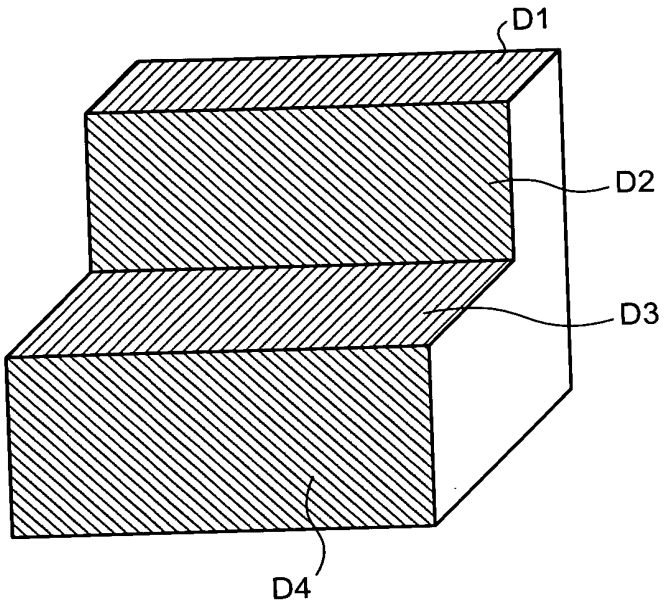


FIG.22

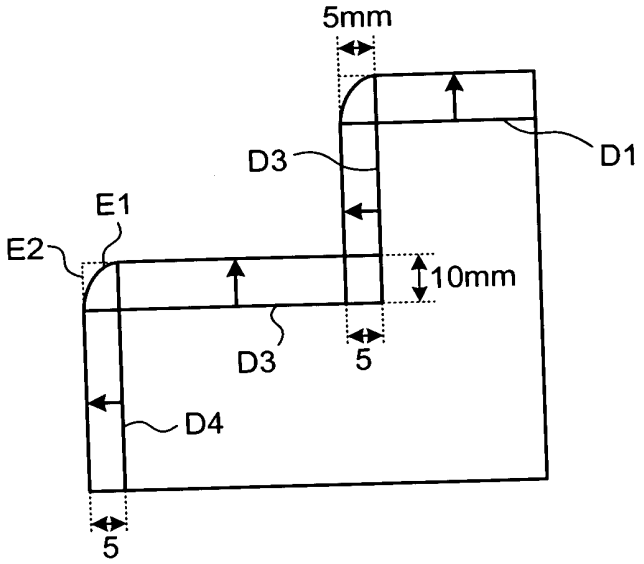


FIG.23

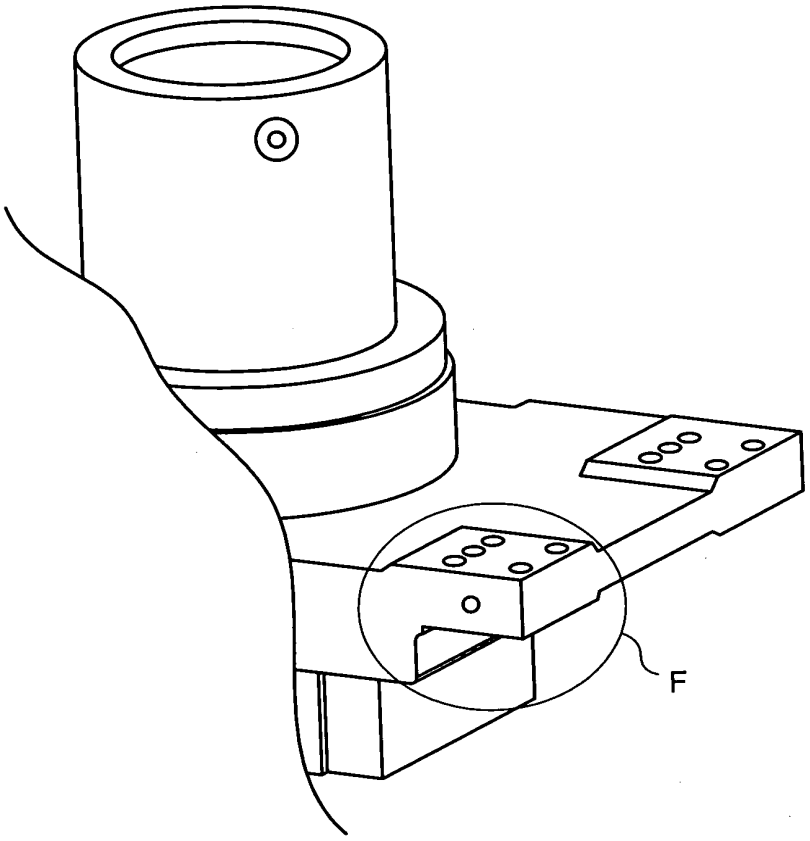


FIG.24

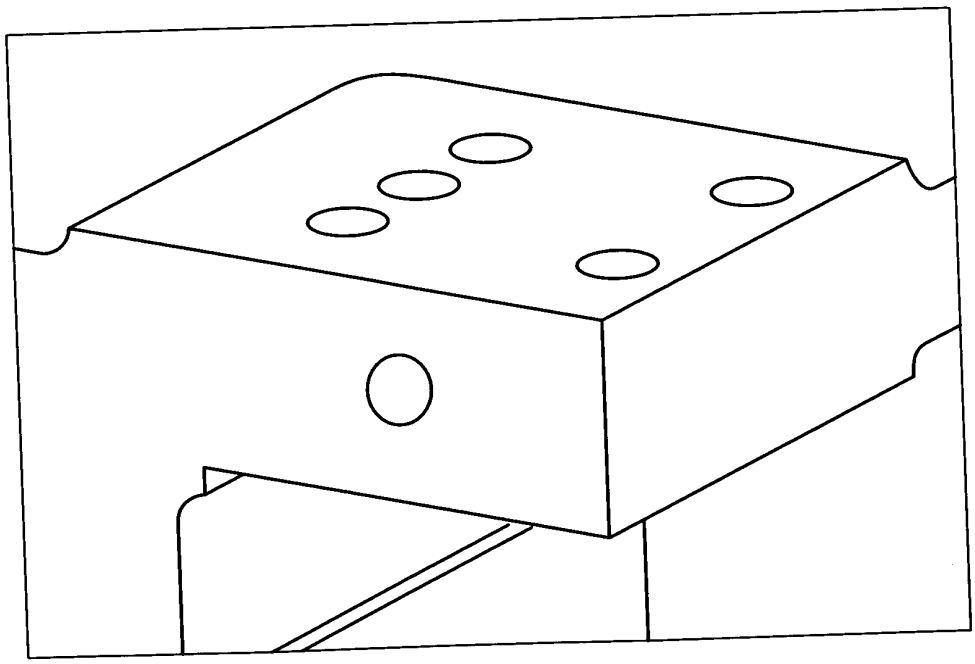


FIG.25

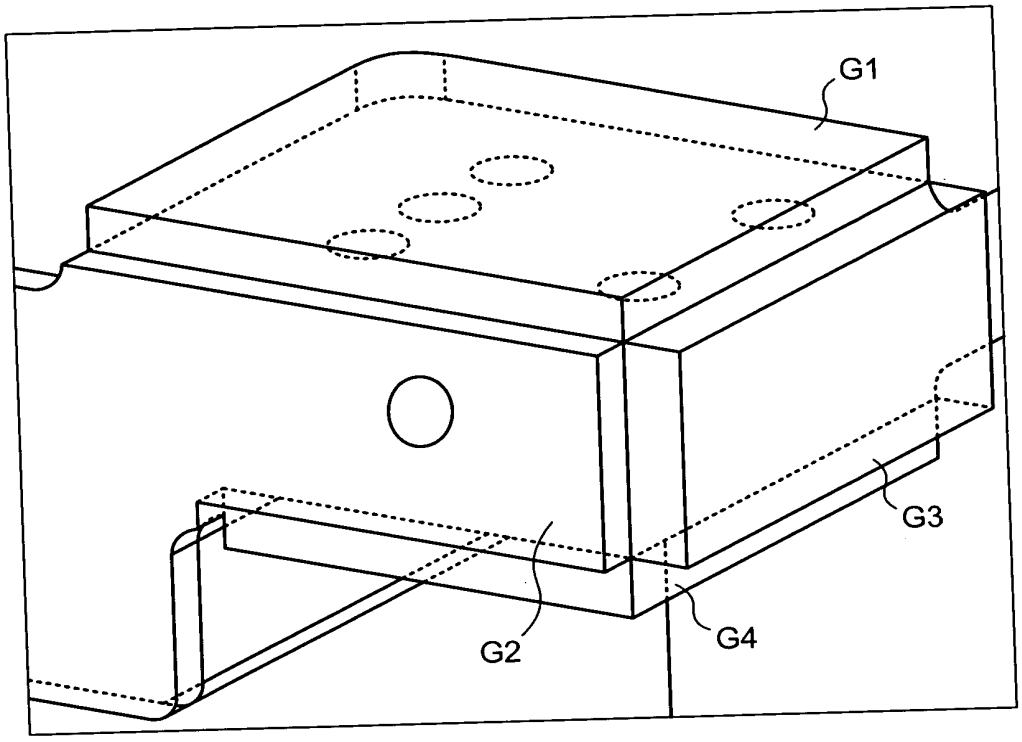


FIG.26

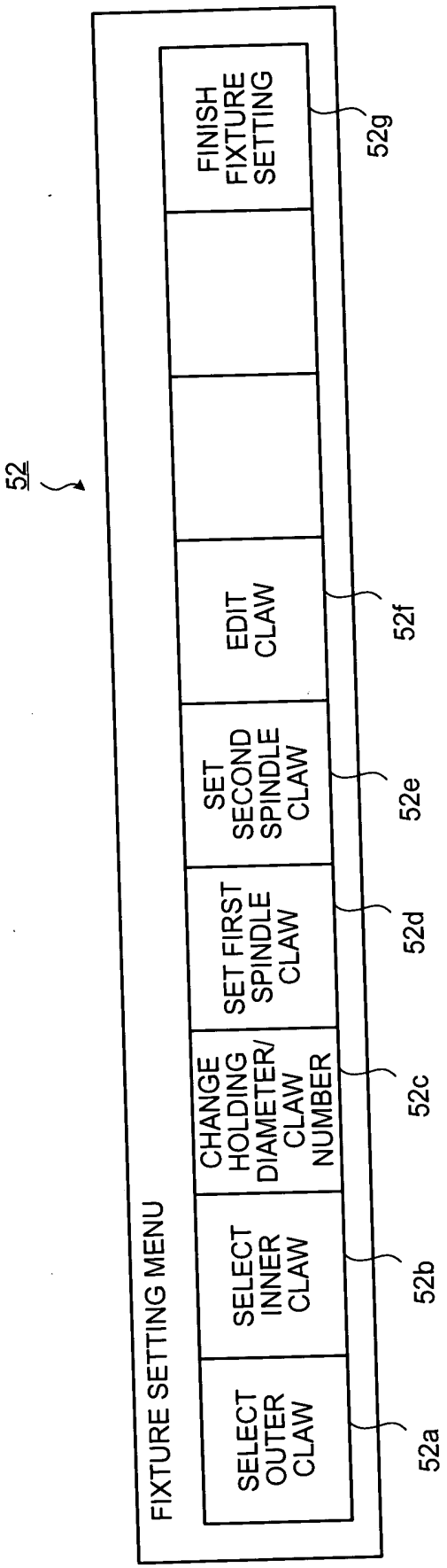

52
FIXTURE SETTING MENU
SELECT OUTER CLAW
SELECT INNER CLAW
CHANGE HOLDING DIAMETER/ CLAW NUMBER
SET FIRST SPINDLE CLAW
SET SECOND SPINDLE CLAW
EDIT CLAW
FINISH FIXTURE SETTING
52a
52b
52c
52d
52e
52f
52g

FIG.27

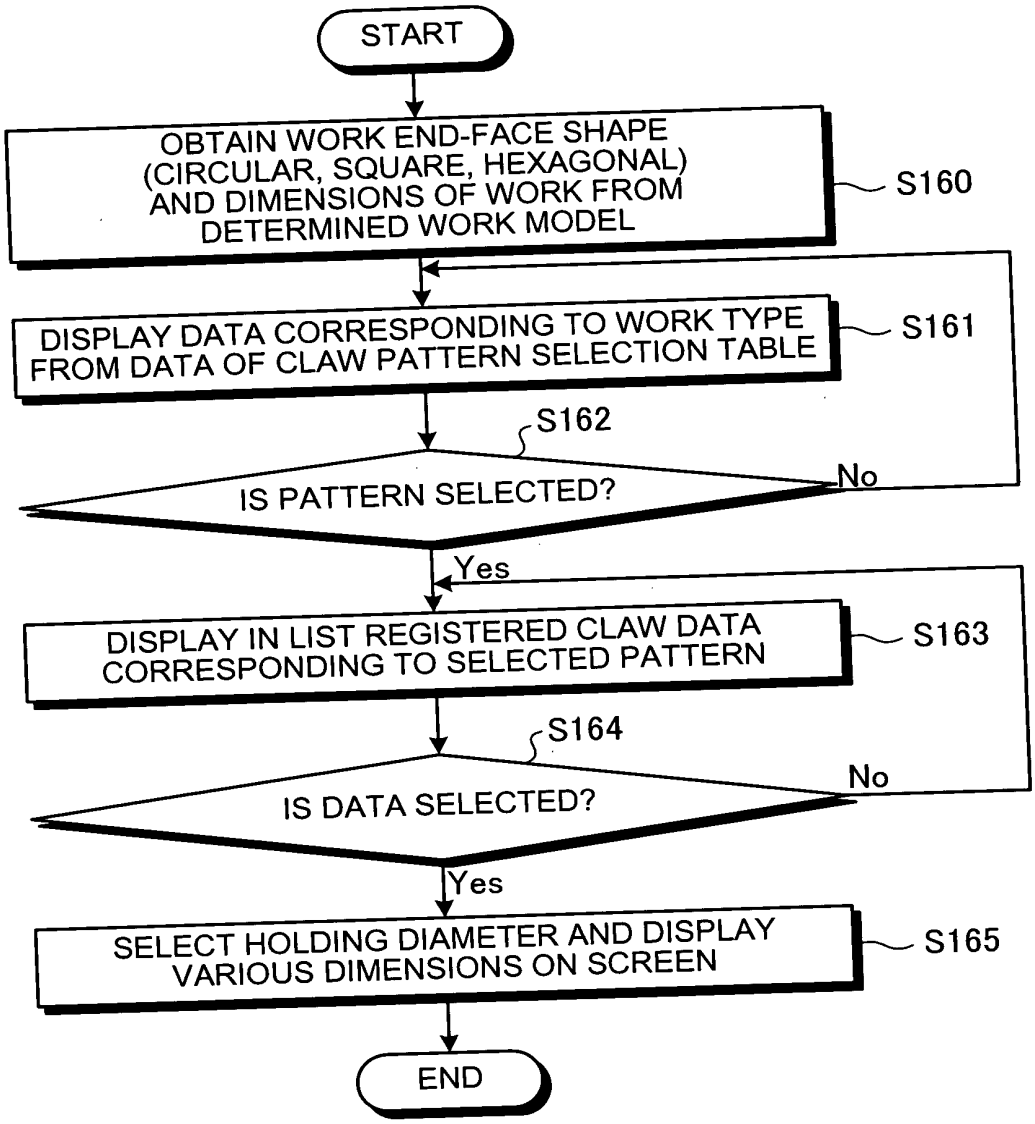
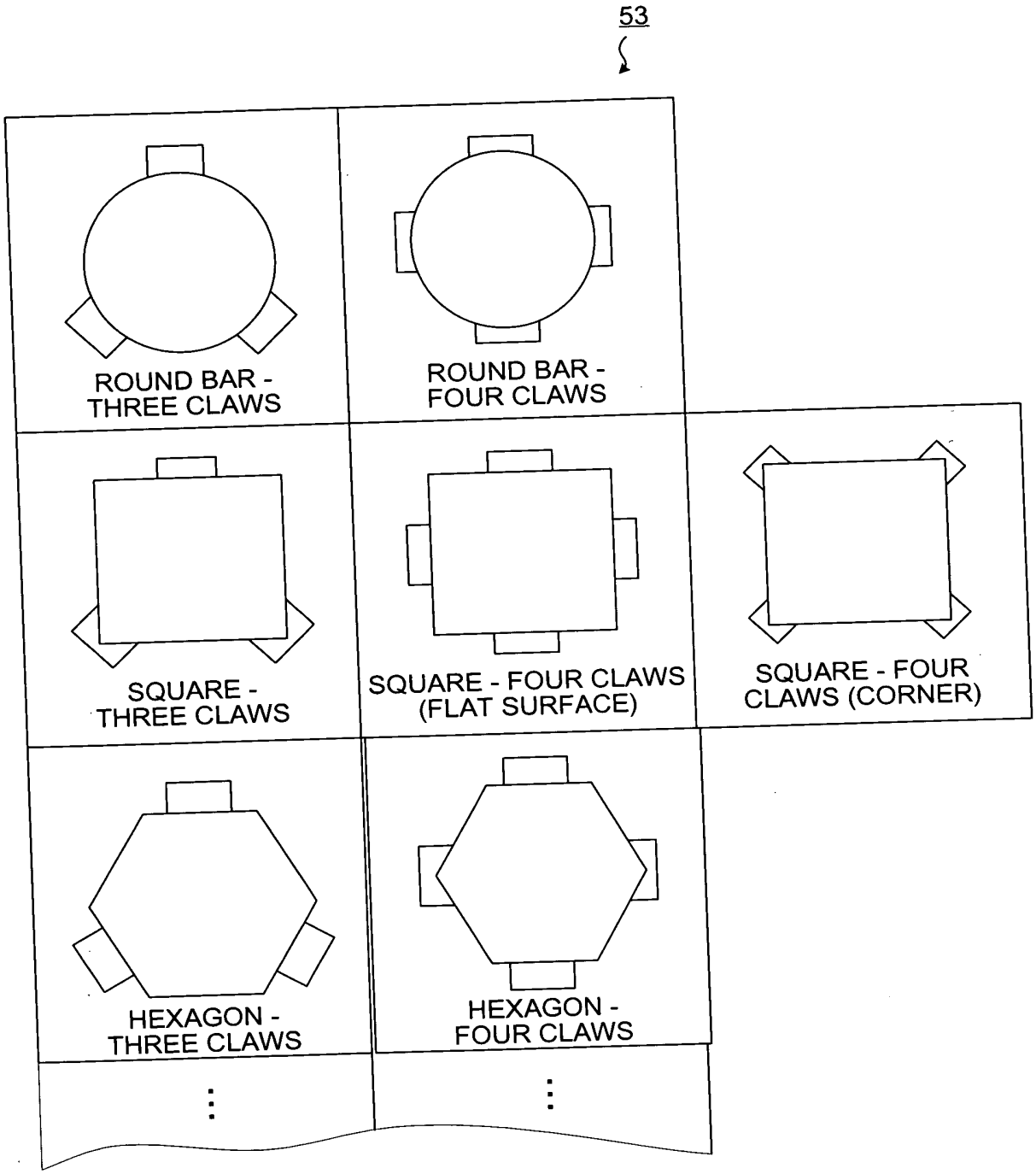

START
OBTAIN WORK END-FACE SHAPE (CIRCULAR, SQUARE, HEXAGONAL) AND DIMENSIONS OF WORK FROM DETERMINED WORK MODEL
S160
DISPLAY DATA CORRESPONDING TO WORK TYPE FROM DATA OF CLAW PATTERN SELECTION TABLE
S161
S162
IS PATTERN SELECTED?
No
Yes
DISPLAY IN LIST REGISTERED CLAW DATA CORRESPONDING TO SELECTED PATTERN
S163
S164
IS DATA SELECTED?
No
Yes
SELECT HOLDING DIAMETER AND DISPLAY VARIOUS DIMENSIONS ON SCREEN
S165
END

FIG.28


53
ROUND BAR - THREE CLAWS
ROUND BAR - FOUR CLAWS
SQUARE - THREE CLAWS
SQUARE - FOUR CLAWS (FLAT SURFACE)
SQUARE - FOUR CLAWS (CORNER)
HEXAGON - THREE CLAWS
HEXAGON - FOUR CLAWS

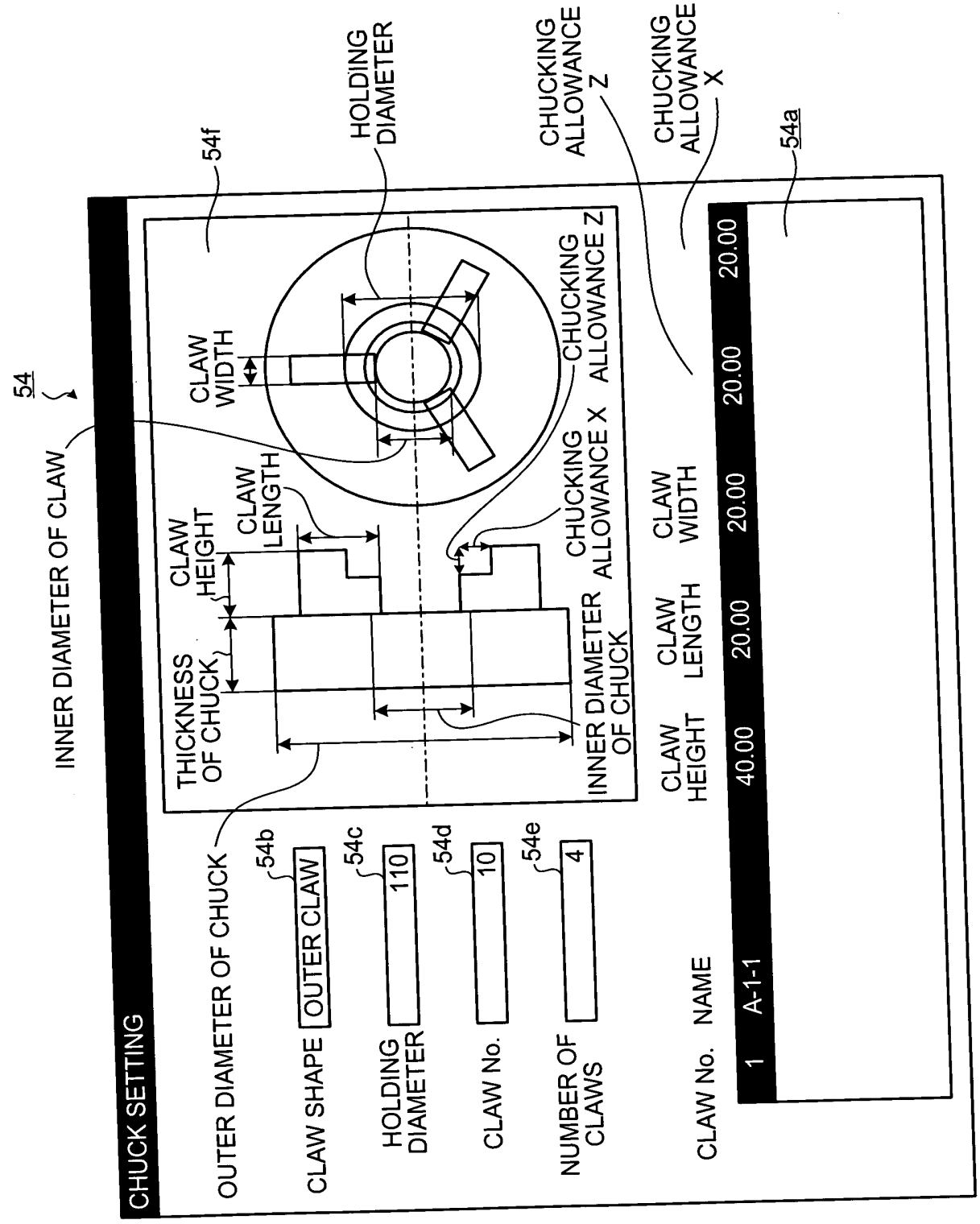

54
INNER DIAMETER OF CLAW
CHUCK SETTING
OUTER DIAMETER OF CHUCK
54b
CLAW SHAPE
OUTER CLAW
54c
HOLDING DIAMETER
110
54d
CLAW No.
10
54e
NUMBER OF CLAWS
4
54f
HOLDING DIAMETER
CLAW WIDTH
CLAW HEIGHT
CLAW LENGTH
THICKNESS OF CHUCK
CHUCKING ALLOWANCE X
CHUCKING ALLOWANCE Z
INNER DIAMETER OF CHUCK
CHUCKING ALLOWANCE Z
CHUCKING ALLOWANCE X
54a
CLAW No.
NAME
CLAW HEIGHT
CLAW LENGTH
CLAW WIDTH
1
A-1-1
40.00
20.00
20.00
20.00
20.00

FIG.29

FIG.30

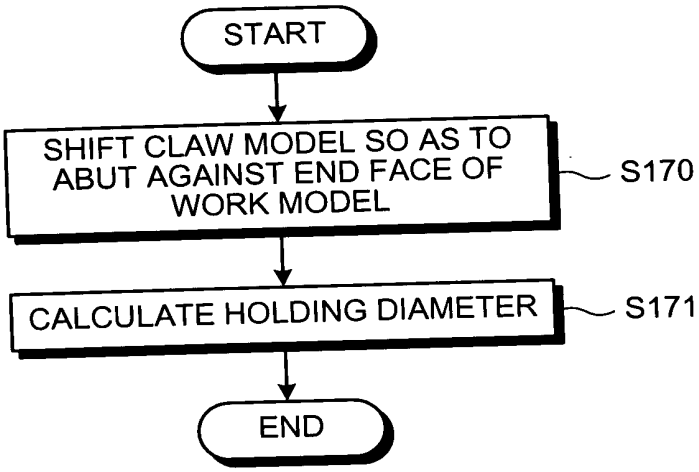

START
SHIFT CLAW MODEL SO AS TO ABUT AGAINST END FACE OF WORK MODEL
S170
CALCULATE HOLDING DIAMETER
S171
END

FIG.31

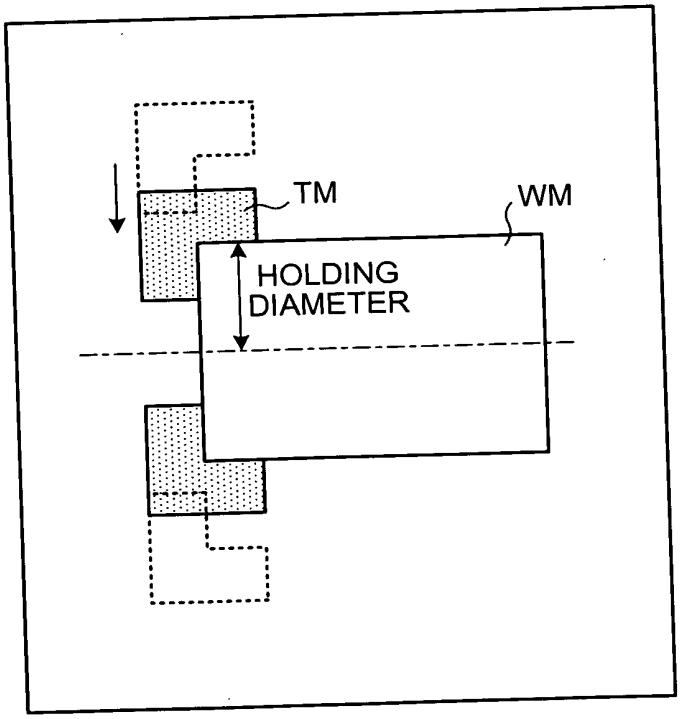

TM
WM
HOLDING DIAMETER

FIG.32

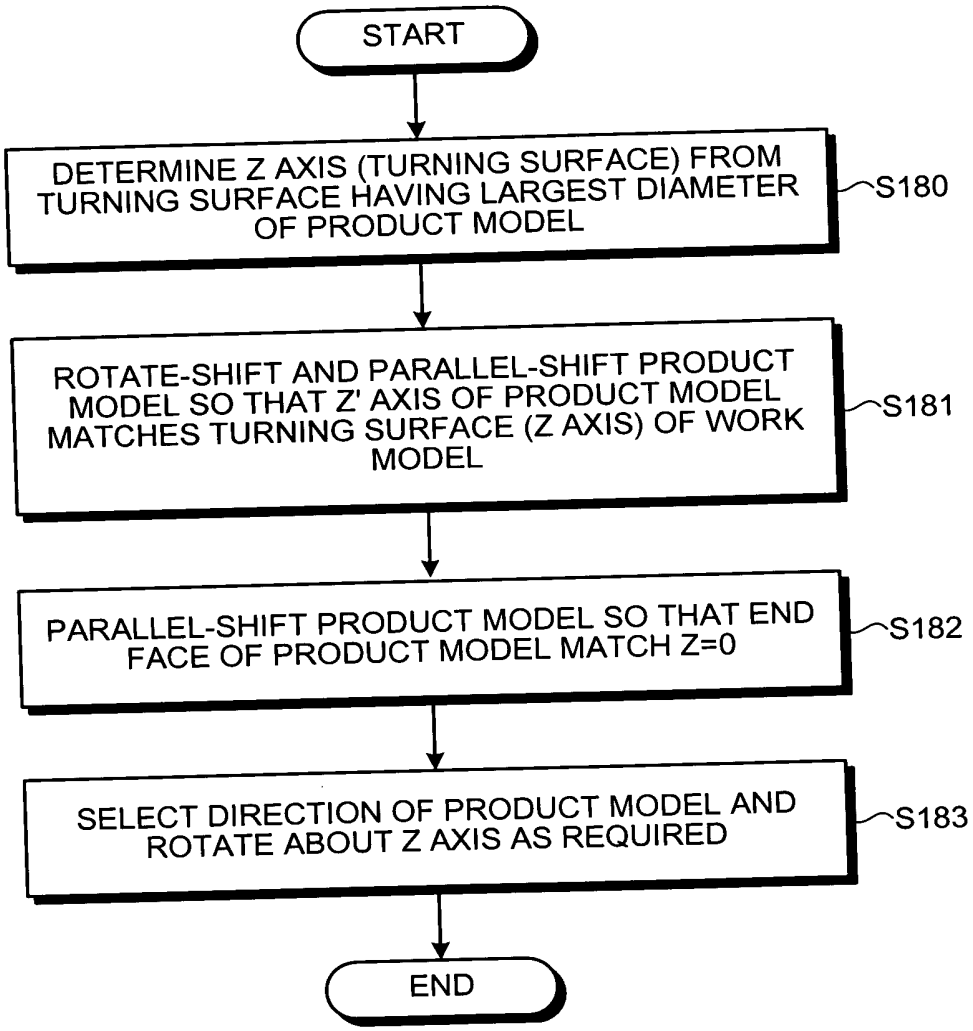

START
DETERMINE Z AXIS (TURNING SURFACE) FROM TURNING SURFACE HAVING LARGEST DIAMETER OF PRODUCT MODEL
S180
ROTATE-SHIFT AND PARALLEL-SHIFT PRODUCT MODEL SO THAT Z' AXIS OF PRODUCT MODEL MATCHES TURNING SURFACE (Z AXIS) OF WORK MODEL
S181
PARALLEL-SHIFT PRODUCT MODEL SO THAT END FACE OF PRODUCT MODEL MATCH Z=0
S182
SELECT DIRECTION OF PRODUCT MODEL AND ROTATE ABOUT Z AXIS AS REQUIRED
S183
END

FIG.33

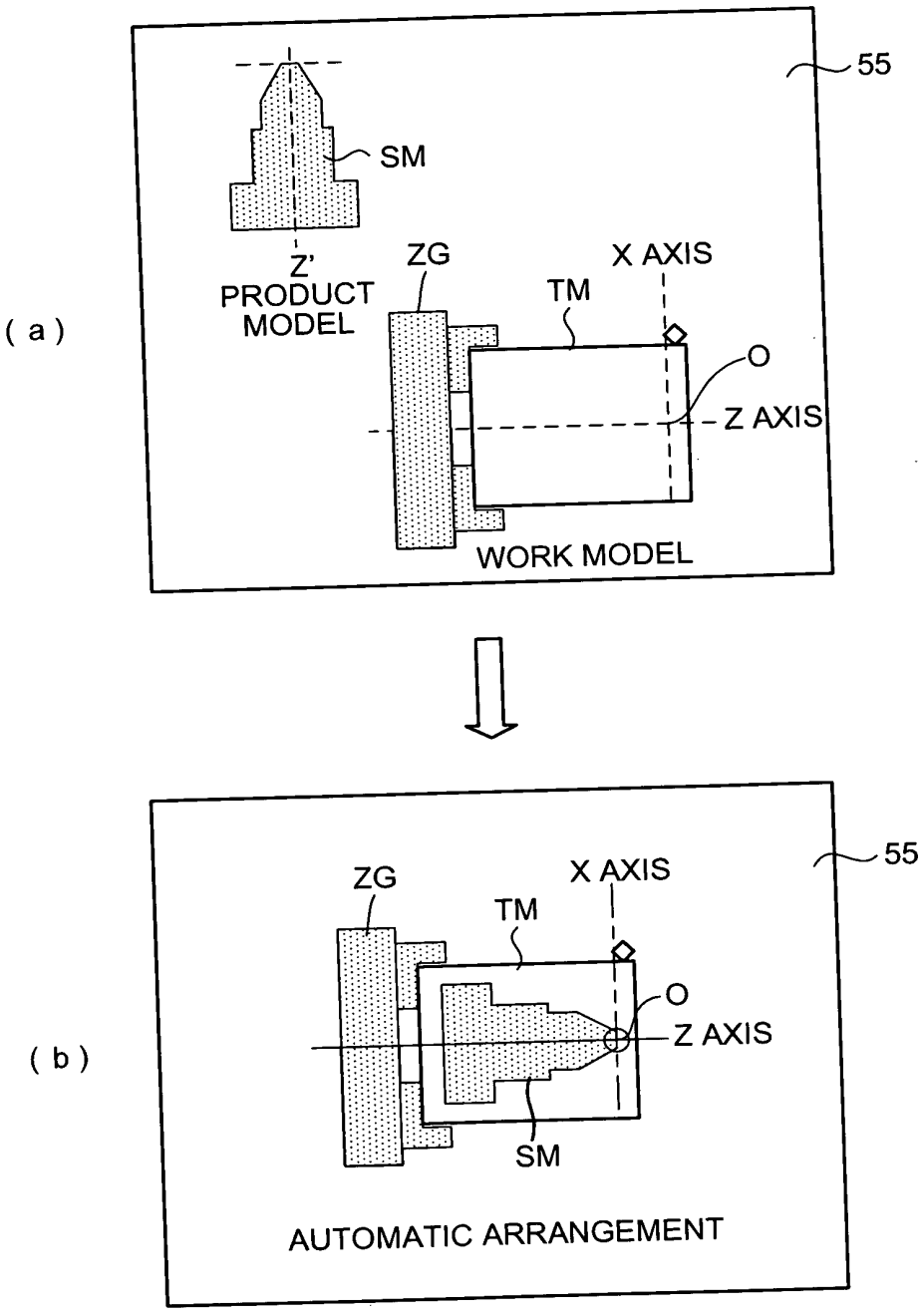

(a)
55
SM
Z'
PRODUCT
MODEL
ZG
X AXIS
TM
O
Z AXIS
WORK MODEL
(b)
55
ZG
X AXIS
TM
O
Z AXIS
SM
AUTOMATIC ARRANGEMENT

FIG.34A

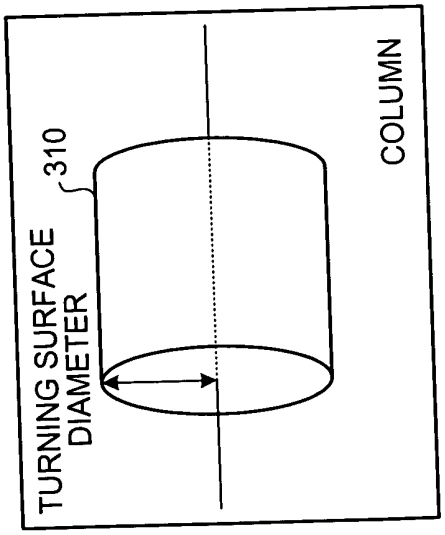


FIG.34B

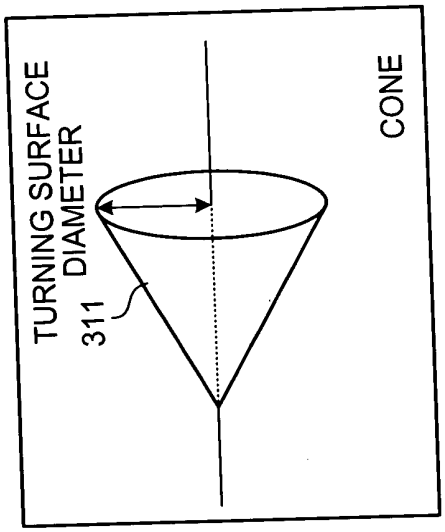


FIG.34C

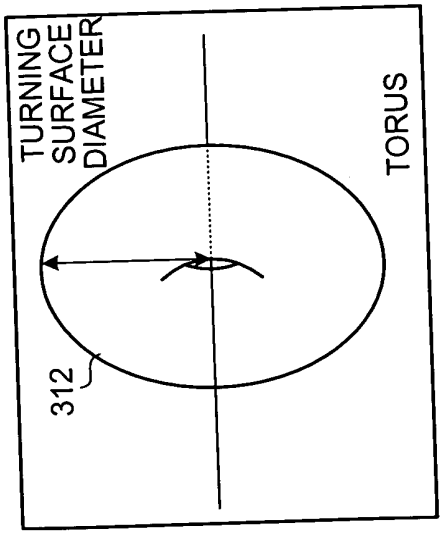


FIG.34D

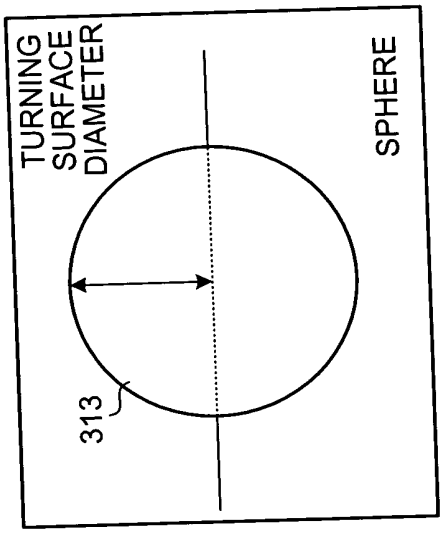


FIG.34E

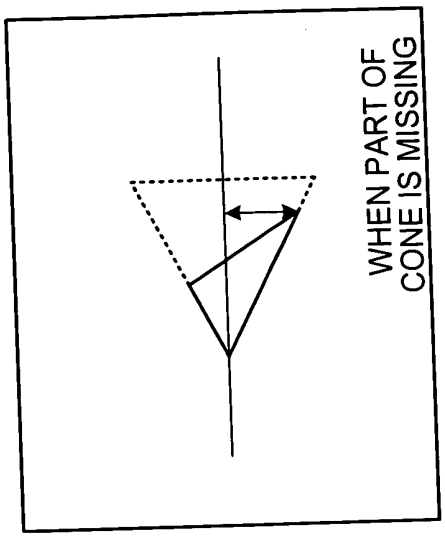


FIG.35

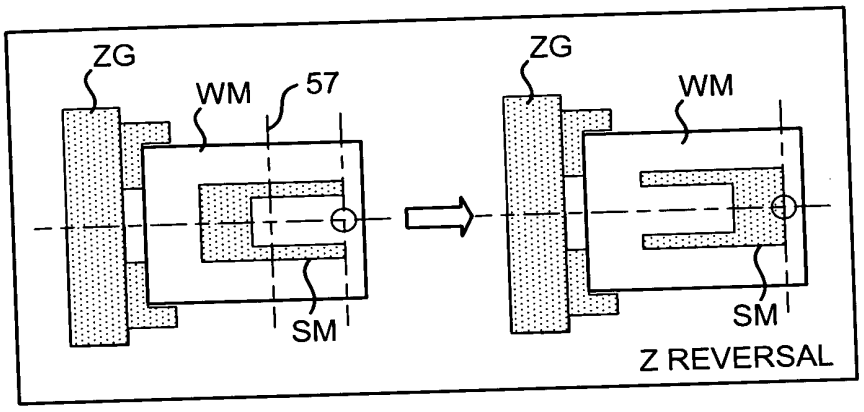


FIG.36

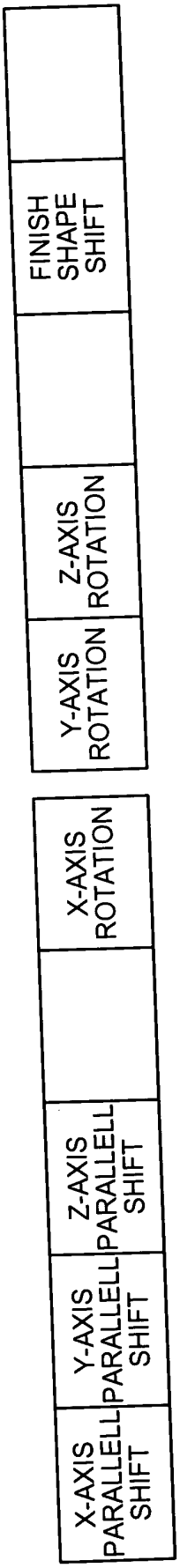

X-AXIS PARALLELL SHIFT
Y-AXIS PARALLELL SHIFT
Z-AXIS PARALLELL SHIFT
X-AXIS ROTATION
Y-AXIS ROTATION
Z-AXIS ROTATION
FINISH SHAPE SHIFT

FIG.37

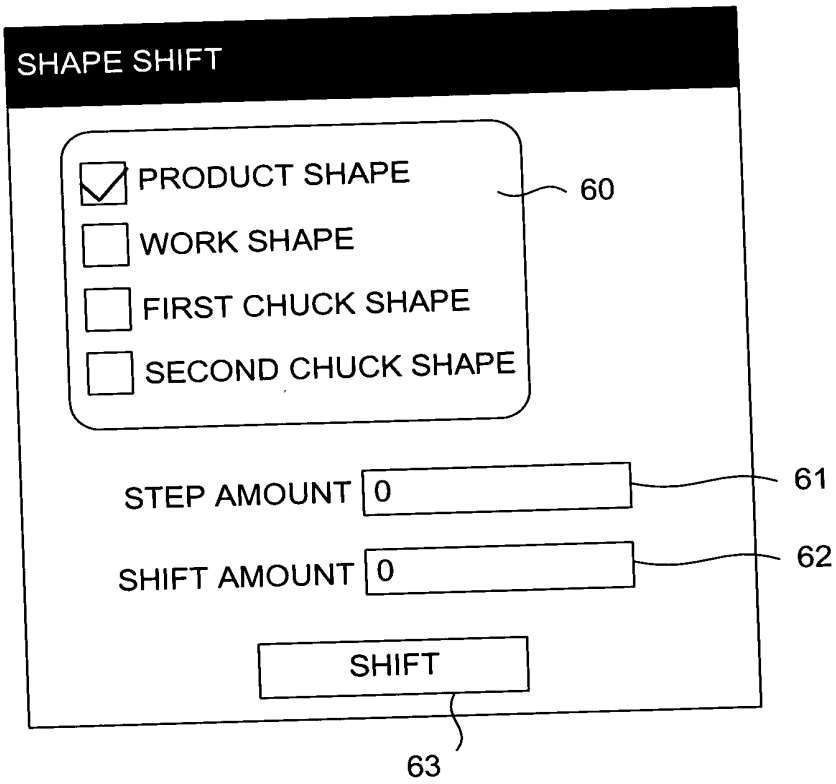

SHAPE SHIFT
PRODUCT SHAPE
WORK SHAPE
FIRST CHUCK SHAPE
SECOND CHUCK SHAPE
60
STEP AMOUNT
0
61
SHIFT AMOUNT
0
62
SHIFT
63

FIG.38

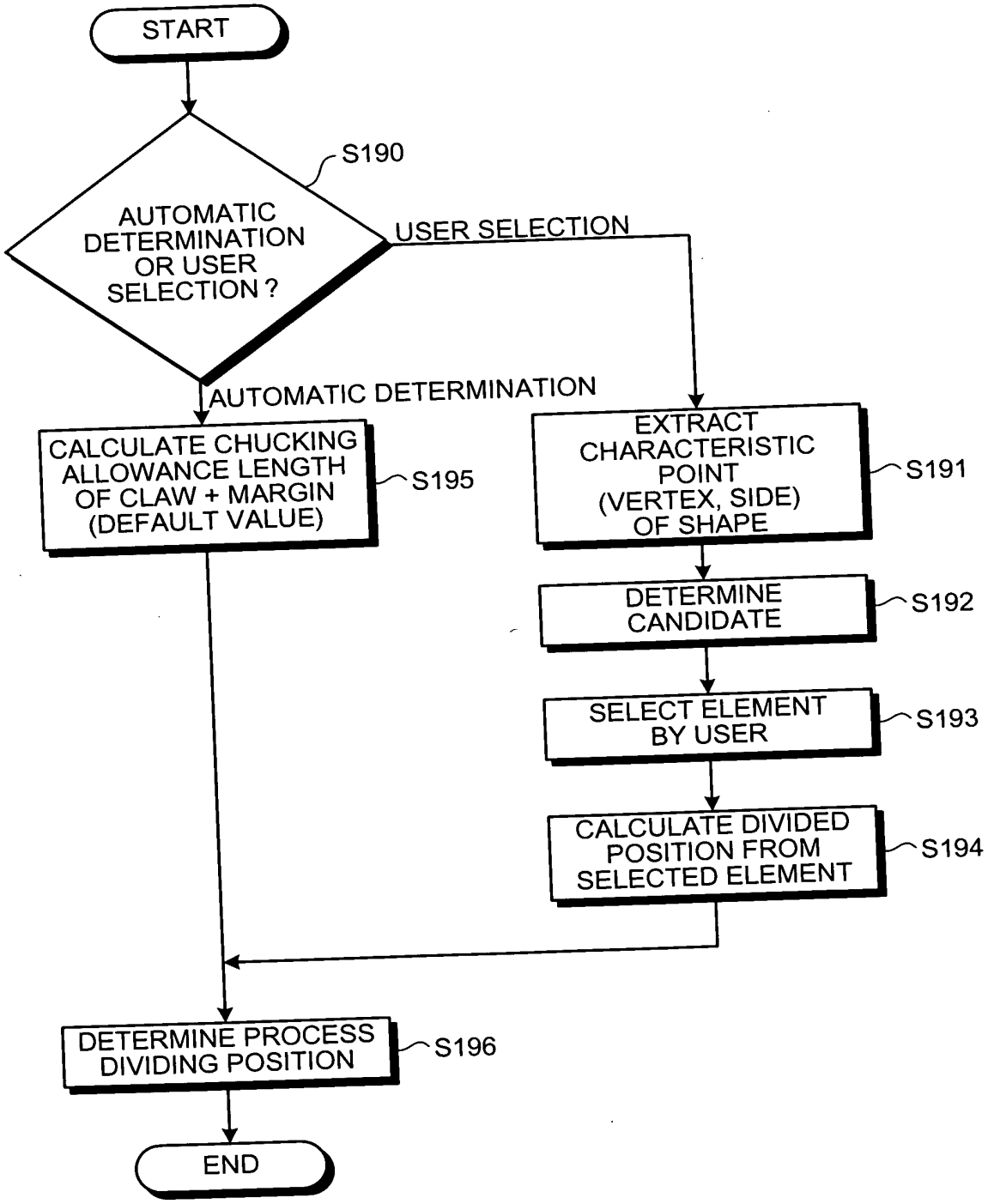

START
S190
AUTOMATIC DETERMINATION OR USER SELECTION ?
USER SELECTION
AUTOMATIC DETERMINATION
CALCULATE CHUCKING ALLOWANCE LENGTH OF CLAW + MARGIN (DEFAULT VALUE)
S195
EXTRACT CHARACTERISTIC POINT (VERTEX, SIDE) OF SHAPE
S191
DETERMINE CANDIDATE
S192
SELECT ELEMENT BY USER
S193
CALCULATE DIVIDED POSITION FROM SELECTED ELEMENT
S194
DETERMINE PROCESS DIVIDING POSITION
S196
END

FIG.39

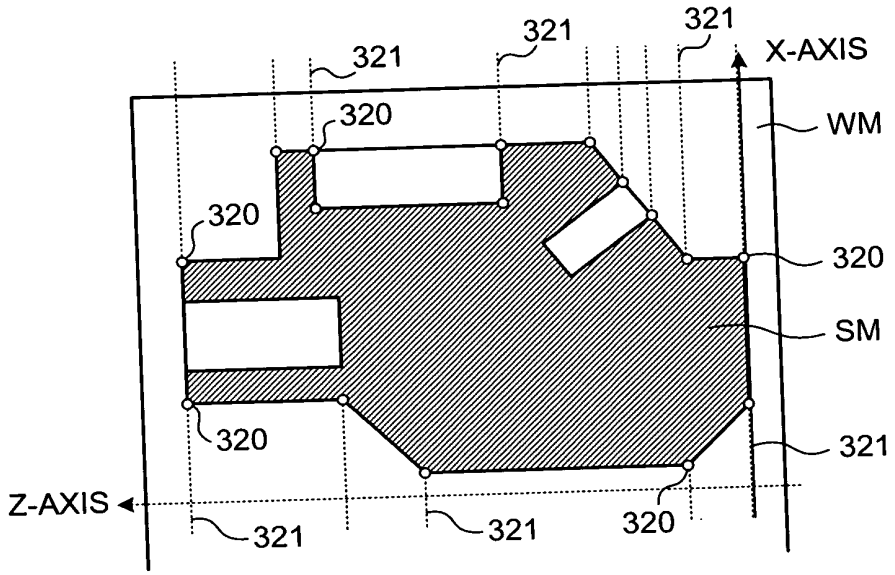

321
321
321
X-AXIS
320
WM
320
320
SM
320
321
Z-AXIS
321
321
320

FIG.40

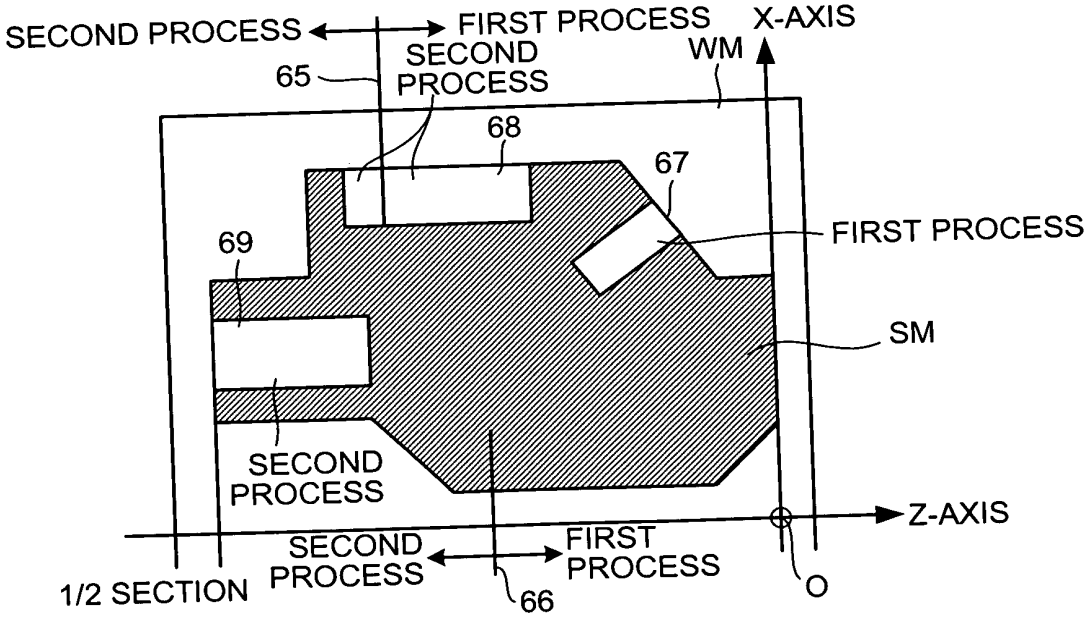

SECOND PROCESS
FIRST PROCESS
X-AXIS
SECOND PROCESS
WM
65
68
67
FIRST PROCESS
69
SM
SECOND PROCESS
Z-AXIS
SECOND PROCESS
FIRST PROCESS
1/2 SECTION
66
O

FIG.41

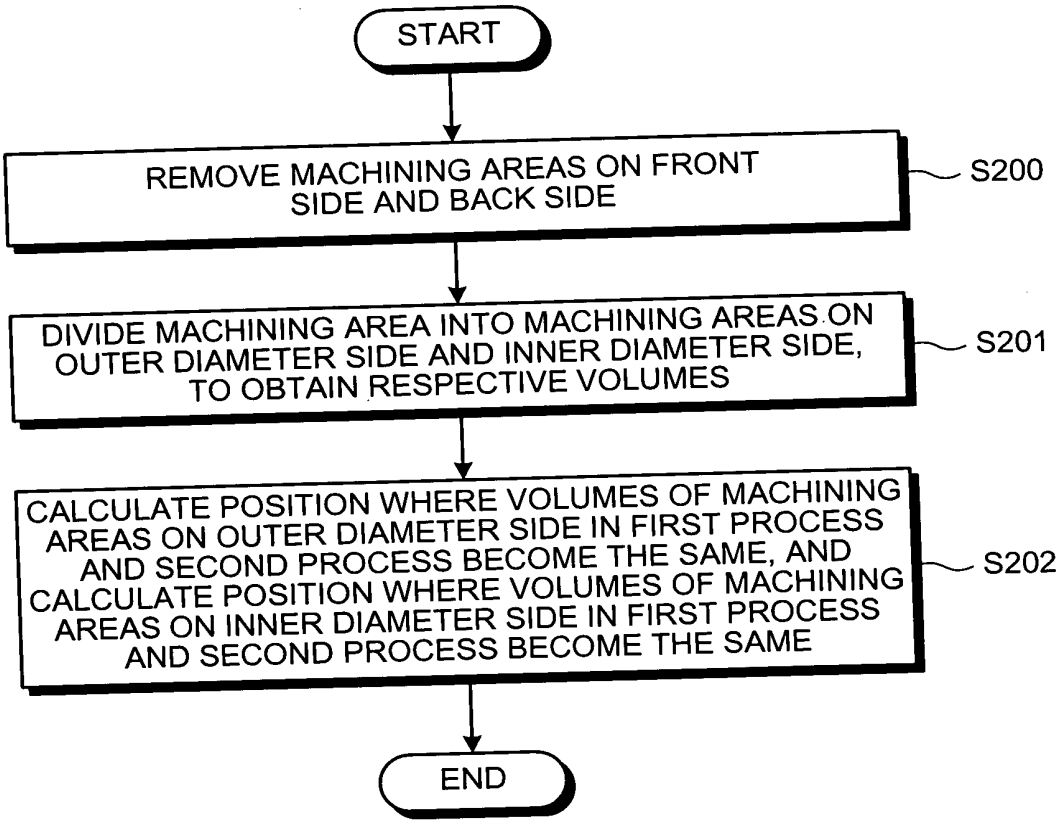

START
REMOVE MACHINING AREAS ON FRONT SIDE AND BACK SIDE
S200
DIVIDE MACHINING AREA INTO MACHINING AREAS ON OUTER DIAMETER SIDE AND INNER DIAMETER SIDE, TO OBTAIN RESPECTIVE VOLUMES
S201
CALCULATE POSITION WHERE VOLUMES OF MACHINING AREAS ON OUTER DIAMETER SIDE IN FIRST PROCESS AND SECOND PROCESS BECOME THE SAME, AND CALCULATE POSITION WHERE VOLUMES OF MACHINING AREAS ON INNER DIAMETER SIDE IN FIRST PROCESS AND SECOND PROCESS BECOME THE SAME
S202
END

FIG.42A

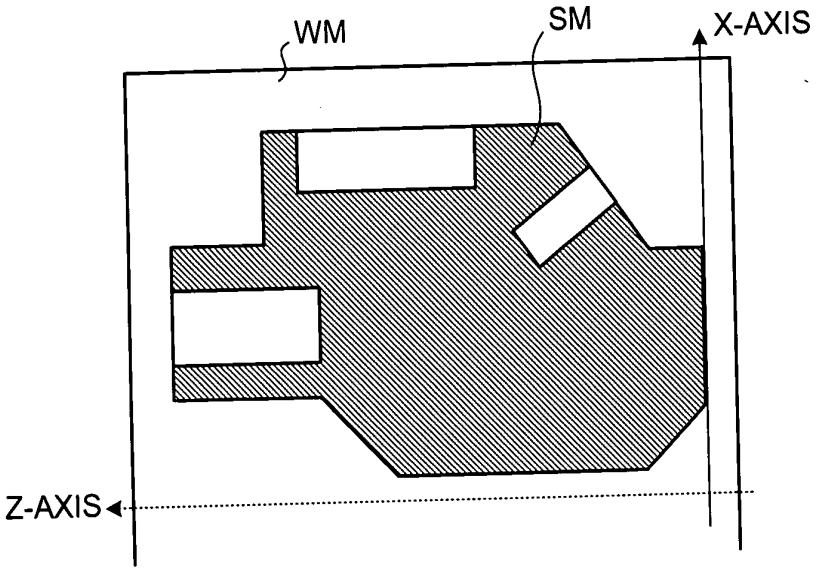


FIG.42B

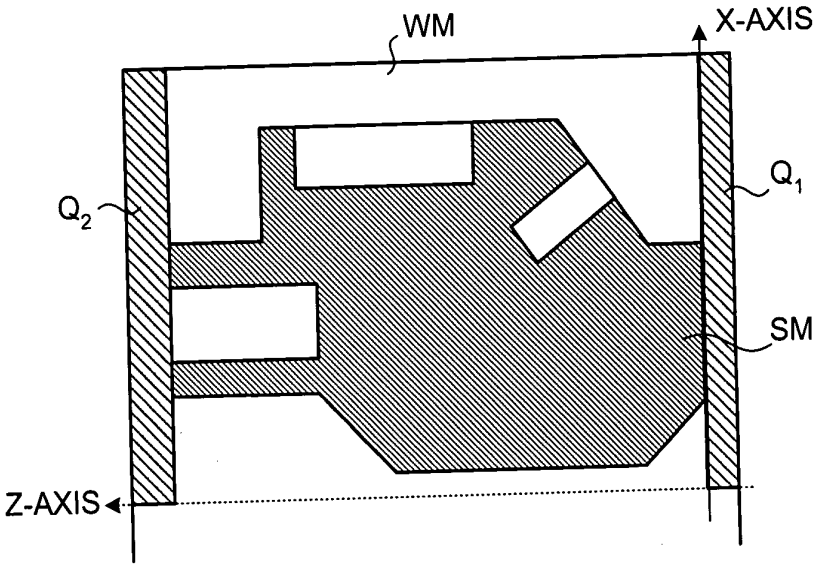


FIG.42C

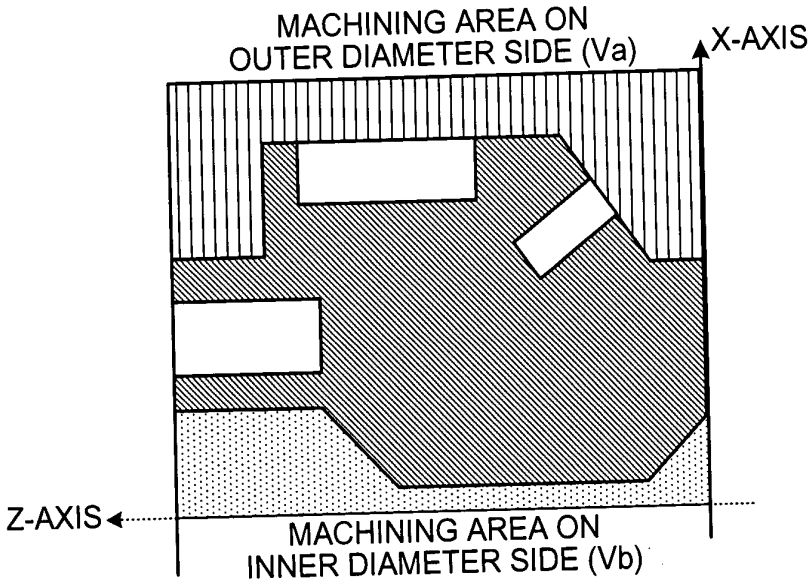


FIG.42D

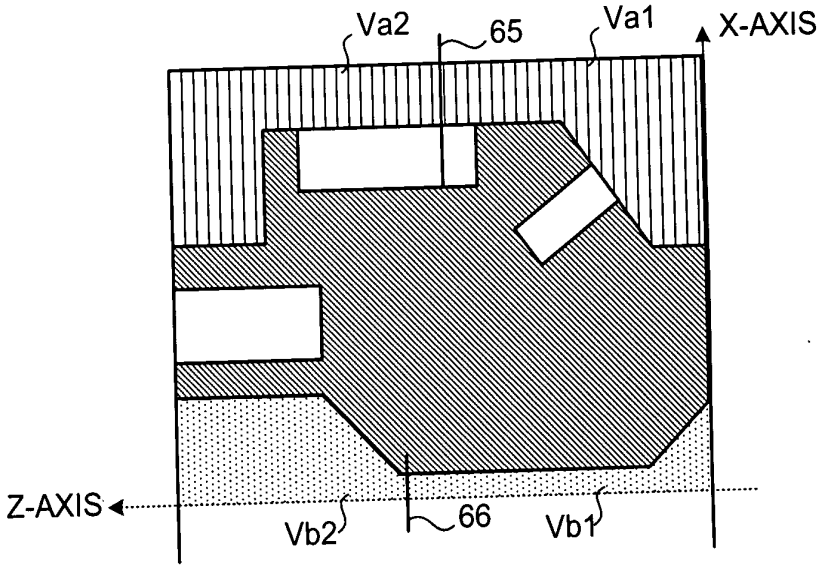


FIG.43

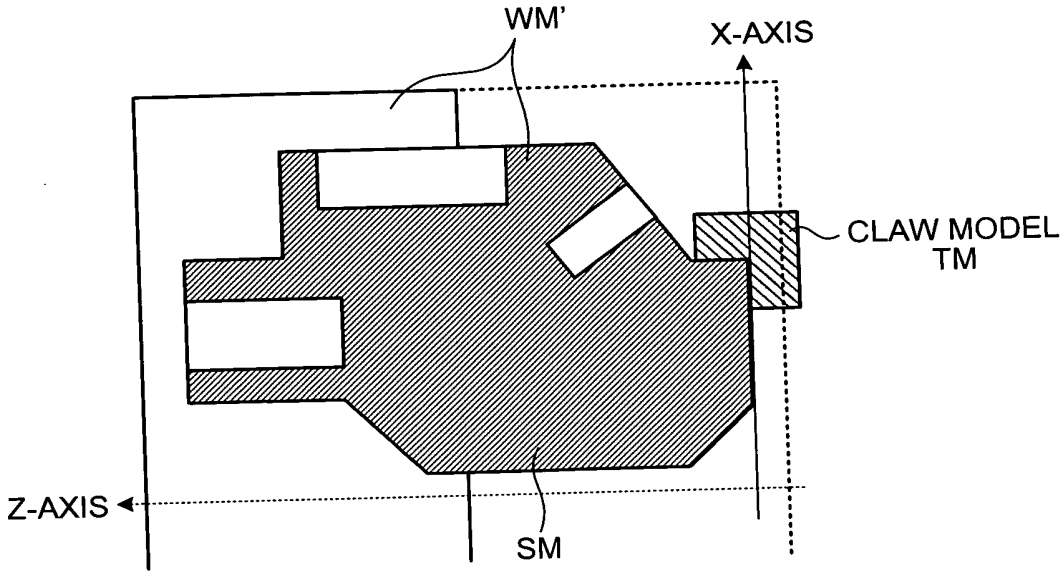


FIG.44

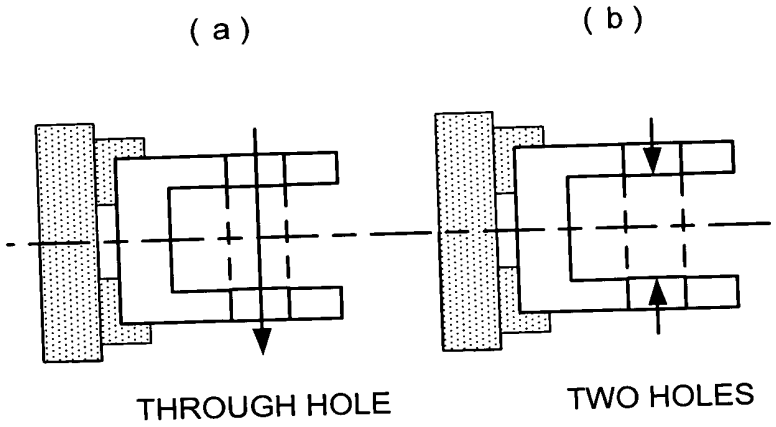


FIG.45

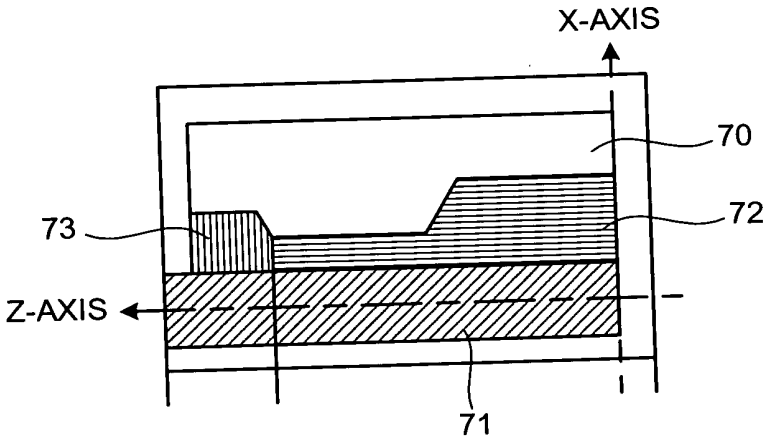


FIG.46

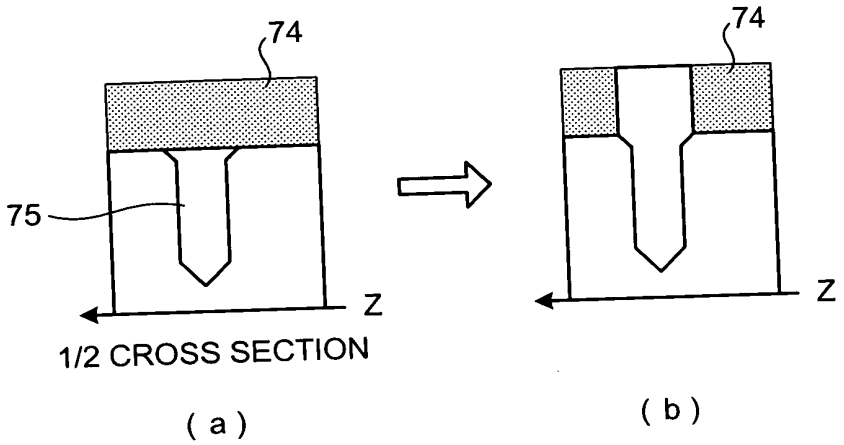

74
75
Z
1/2 CROSS SECTION
(a)
74
Z
(b)

FIG.47

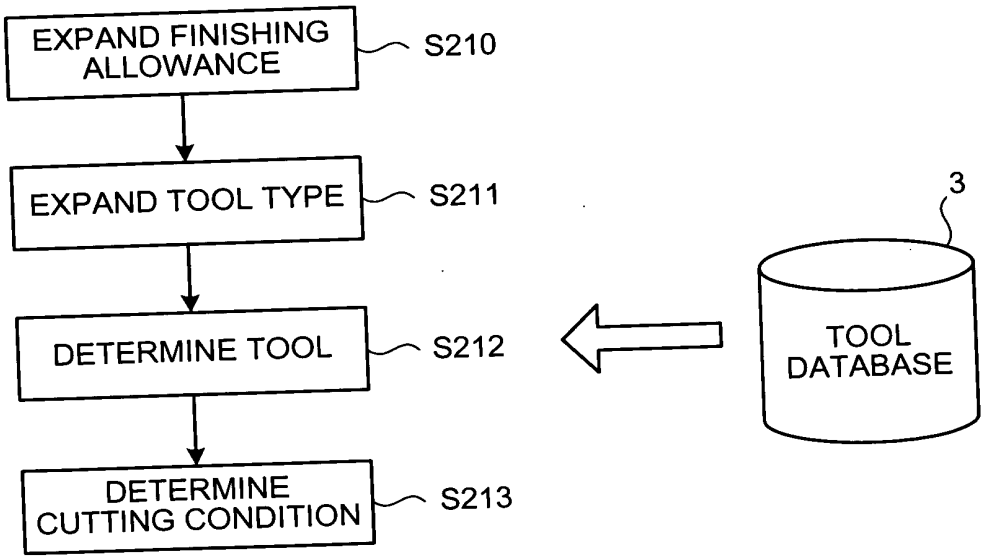

EXPAND FINISHING ALLOWANCE
S210
EXPAND TOOL TYPE
S211
DETERMINE TOOL
S212
DETERMINE CUTTING CONDITION
S213
3
TOOL DATABASE

FIG.48

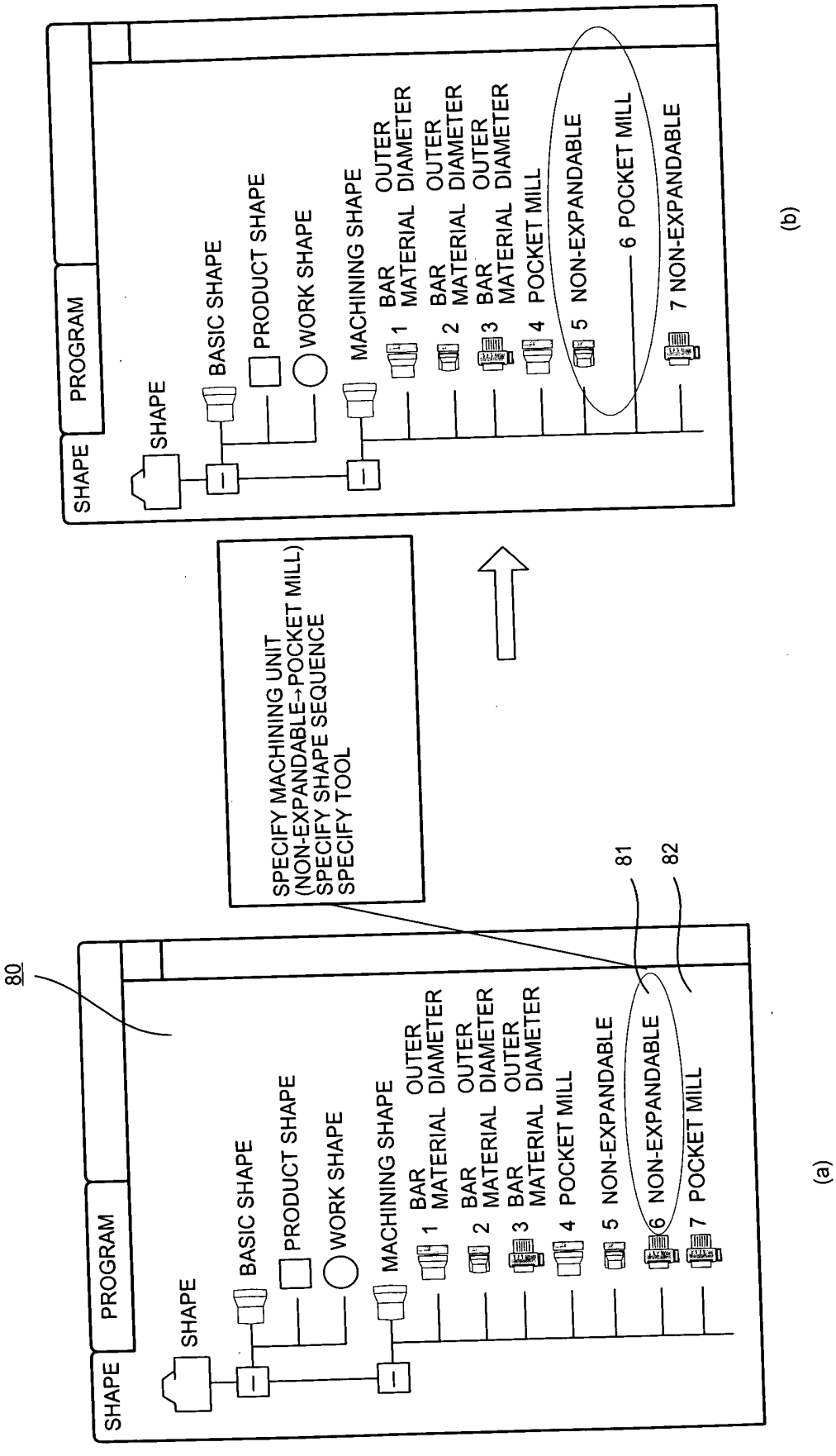

80
SHAPE
PROGRAM
SHAPE
BASIC SHAPE
PRODUCT SHAPE
WORK SHAPE
MACHINING SHAPE
1 BAR MATERIAL OUTER DIAMETER
2 BAR MATERIAL OUTER DIAMETER
3 BAR MATERIAL OUTER DIAMETER
4 POCKET MILL
5 NON-EXPANDABLE
6 NON-EXPANDABLE
7 POCKET MILL
81
82
SPECIFY MACHINING UNIT
(NON-EXPANDABLE→POCKET MILL)
SPECIFY SHAPE SEQUENCE
SPECIFY TOOL
(a)
(b)

FIG.49

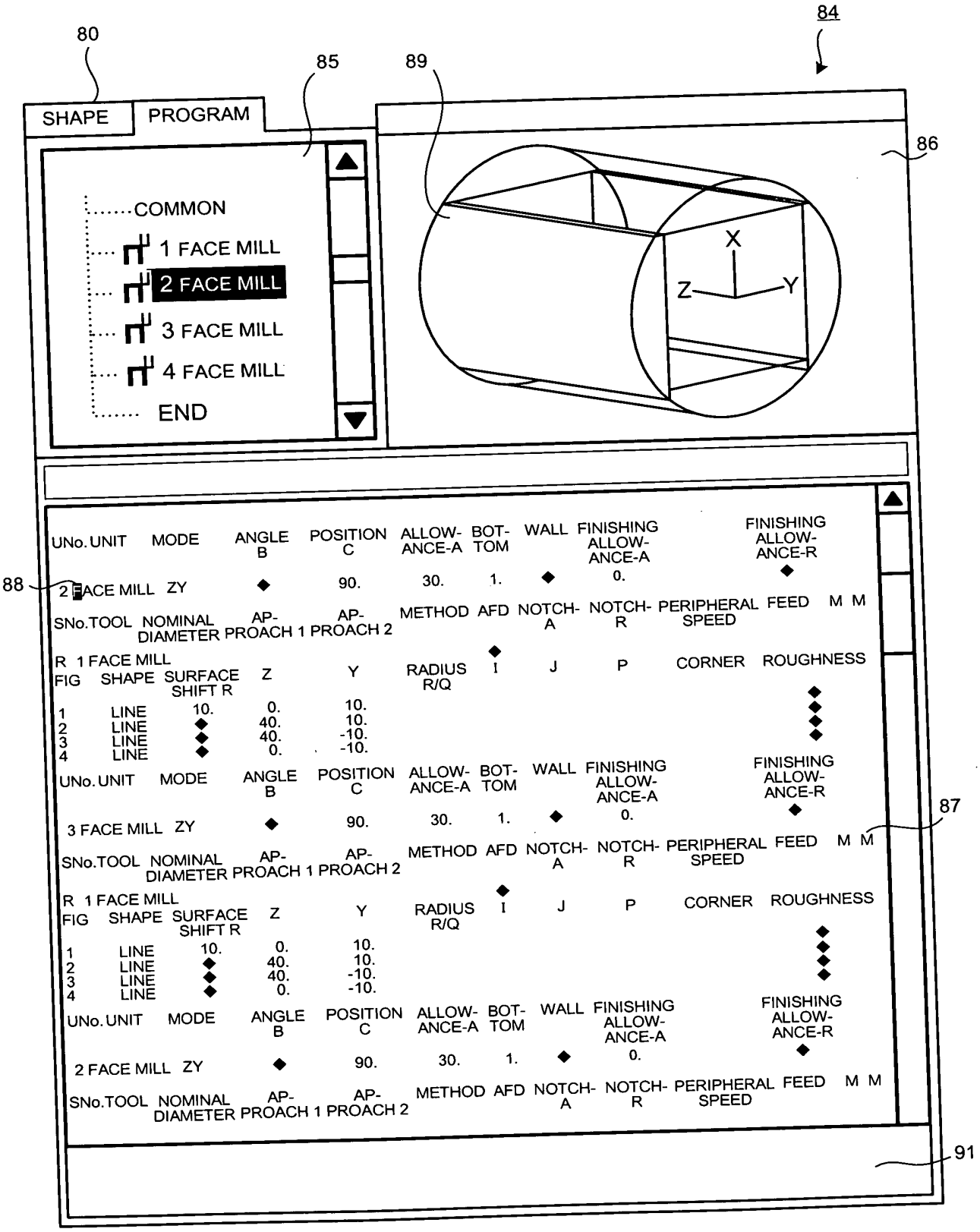

80
84
85
89
SHAPE
PROGRAM
COMMON
1 FACE MILL
2 FACE MILL
3 FACE MILL
4 FACE MILL
END
86
X
Z
Y
88
UNo. UNIT MODE ANGLE B POSITION C ALLOW-ANCE-A BOT-TOM WALL FINISHING ALLOW-ANCE-A FINISHING ALLOW-ANCE-R
2 FACE MILL ZY ◆ 90. 30. 1. ◆ 0. ◆
SNo. TOOL NOMINAL DIAMETER AP-PROACH 1 AP-PROACH 2 METHOD AFD NOTCH-A NOTCH-R PERIPHERAL SPEED FEED M M
R 1 FACE MILL ◆
FIG SHAPE SURFACE SHIFT R Z Y RADIUS R/Q I J P CORNER ROUGHNESS
1 LINE 10. 0. 10. ◆
2 LINE ◆ 40. 10. ◆
3 LINE ◆ 40. -10. ◆
4 LINE ◆ 0. -10. ◆
UNo. UNIT MODE ANGLE B POSITION C ALLOW-ANCE-A BOT-TOM WALL FINISHING ALLOW-ANCE-A FINISHING ALLOW-ANCE-R
3 FACE MILL ZY ◆ 90. 30. 1. ◆ 0. ◆
87
SNo. TOOL NOMINAL DIAMETER AP-PROACH 1 AP-PROACH 2 METHOD AFD NOTCH-A NOTCH-R PERIPHERAL SPEED FEED M M
R 1 FACE MILL ◆
FIG SHAPE SURFACE SHIFT R Z Y RADIUS R/Q I J P CORNER ROUGHNESS
1 LINE 10. 0. 10. ◆
2 LINE ◆ 40. 10. ◆
3 LINE ◆ 40. -10. ◆
4 LINE ◆ 0. -10. ◆
UNo. UNIT MODE ANGLE B POSITION C ALLOW-ANCE-A BOT-TOM WALL FINISHING ALLOW-ANCE-A FINISHING ALLOW-ANCE-R
2 FACE MILL ZY ◆ 90. 30. 1. ◆ 0. ◆
SNo. TOOL NOMINAL DIAMETER AP-PROACH 1 AP-PROACH 2 METHOD AFD NOTCH-A NOTCH-R PERIPHERAL SPEED FEED M M
91

FIG.50

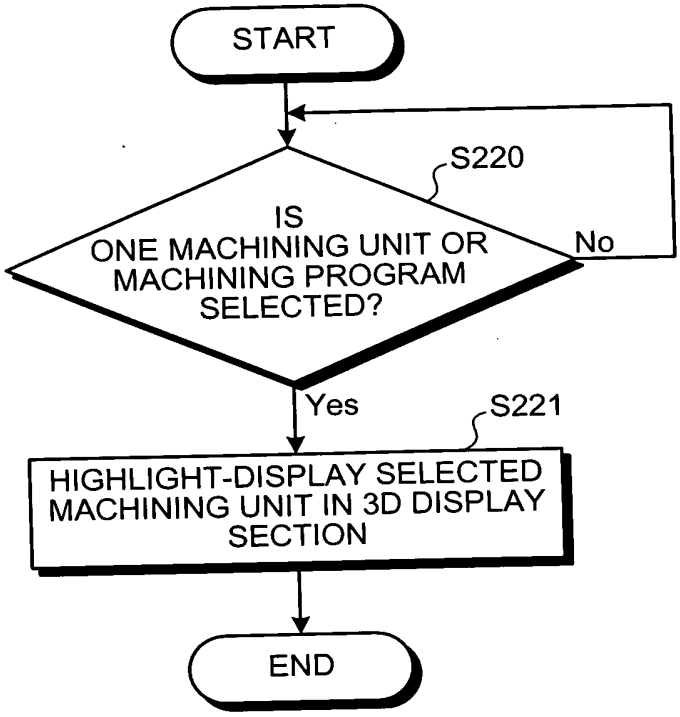


FIG.51A

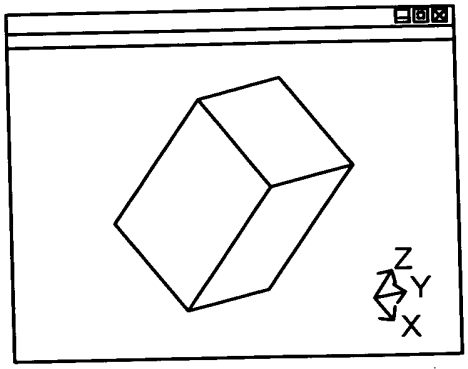


FIG.51B

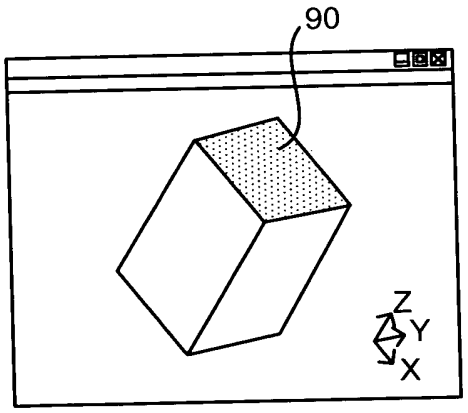


FIG.52

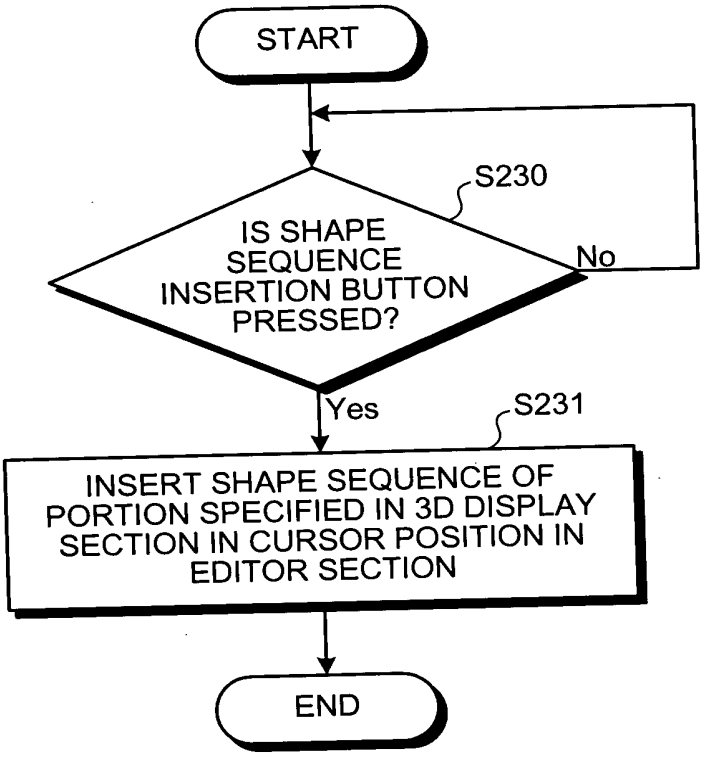

START
S230
IS SHAPE SEQUENCE INSERTION BUTTON PRESSED?
No
Yes
S231
INSERT SHAPE SEQUENCE OF PORTION SPECIFIED IN 3D DISPLAY SECTION IN CURSOR POSITION IN EDITOR SECTION
END

FIG.53

UNIT

MODE

NON-EXPANDABLE /Y

FIG	SHAPE	SURFACE SHIFT Z	SURFACE SHIFT R	X	Y	RADIUS R/	I	J	ANGLE B	ANGLE C
1	LINE (SUPPORT)	0	0	18.487	-29.602				0	0
2	LINE	◆	◆	18.487	-18.5				◆	◆
3	LINE	◆	◆	-18.487	-18.5				◆	◆
4	LINE	◆	◆	-18.487	-29.602				◆	◆
5	LINE	◆	◆	18.487	-29.602				◆	◆

FIG.54

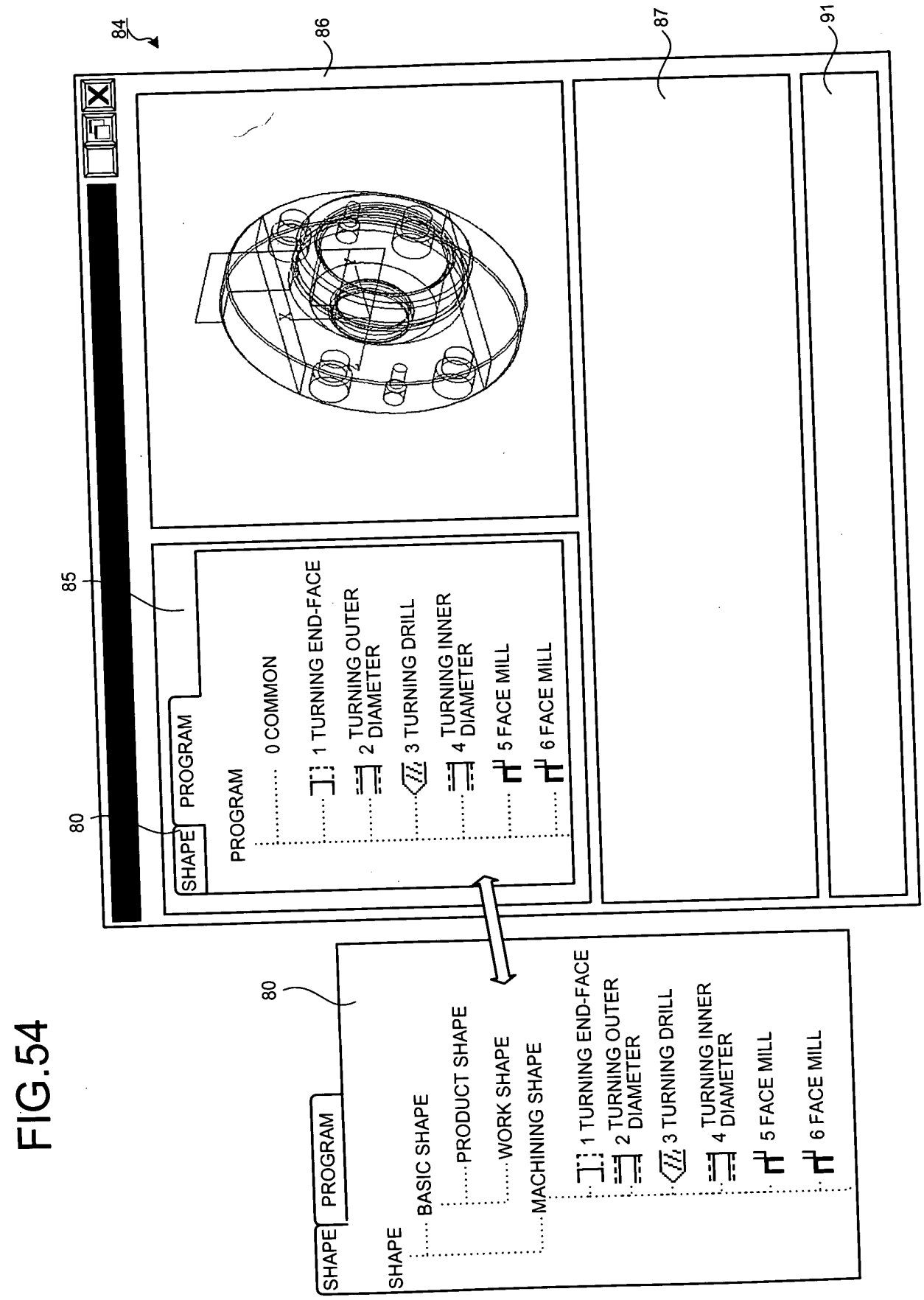

84
86
87
91
85
80
SHAPE
PROGRAM
PROGRAM
0 COMMON
1 TURNING END-FACE
2 TURNING OUTER DIAMETER
3 TURNING DRILL
4 TURNING INNER DIAMETER
5 FACE MILL
6 FACE MILL
80
SHAPE
PROGRAM
SHAPE
BASIC SHAPE
PRODUCT SHAPE
WORK SHAPE
MACHINING SHAPE
1 TURNING END-FACE
2 TURNING OUTER DIAMETER
3 TURNING DRILL
4 TURNING INNER DIAMETER
5 FACE MILL
6 FACE MILL

FIG.55

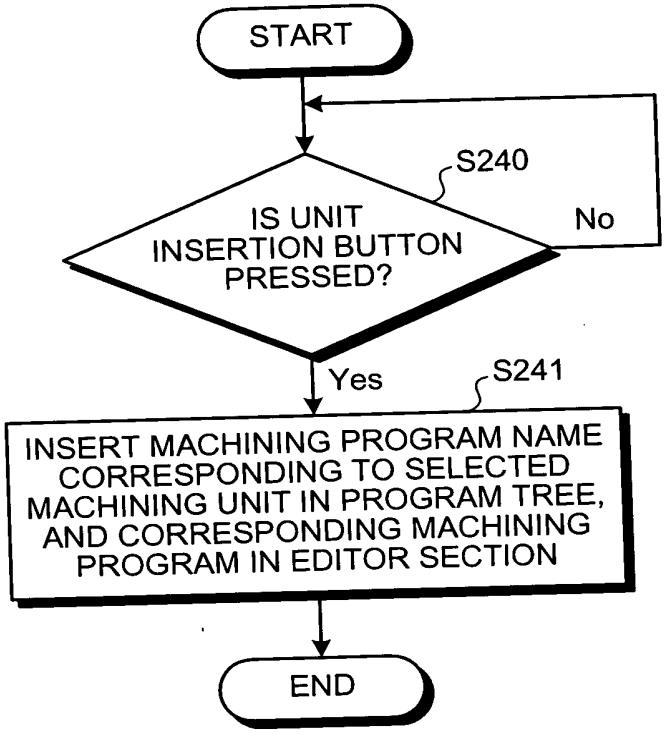

START
S240
IS UNIT INSERTION BUTTON PRESSED?
No
Yes
S241
INSERT MACHINING PROGRAM NAME CORRESPONDING TO SELECTED MACHINING UNIT IN PROGRAM TREE, AND CORRESPONDING MACHINING PROGRAM IN EDITOR SECTION
END

FIG.56

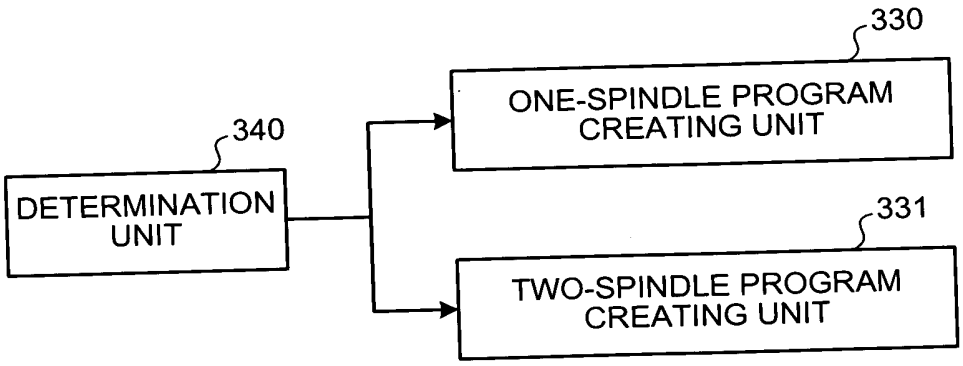
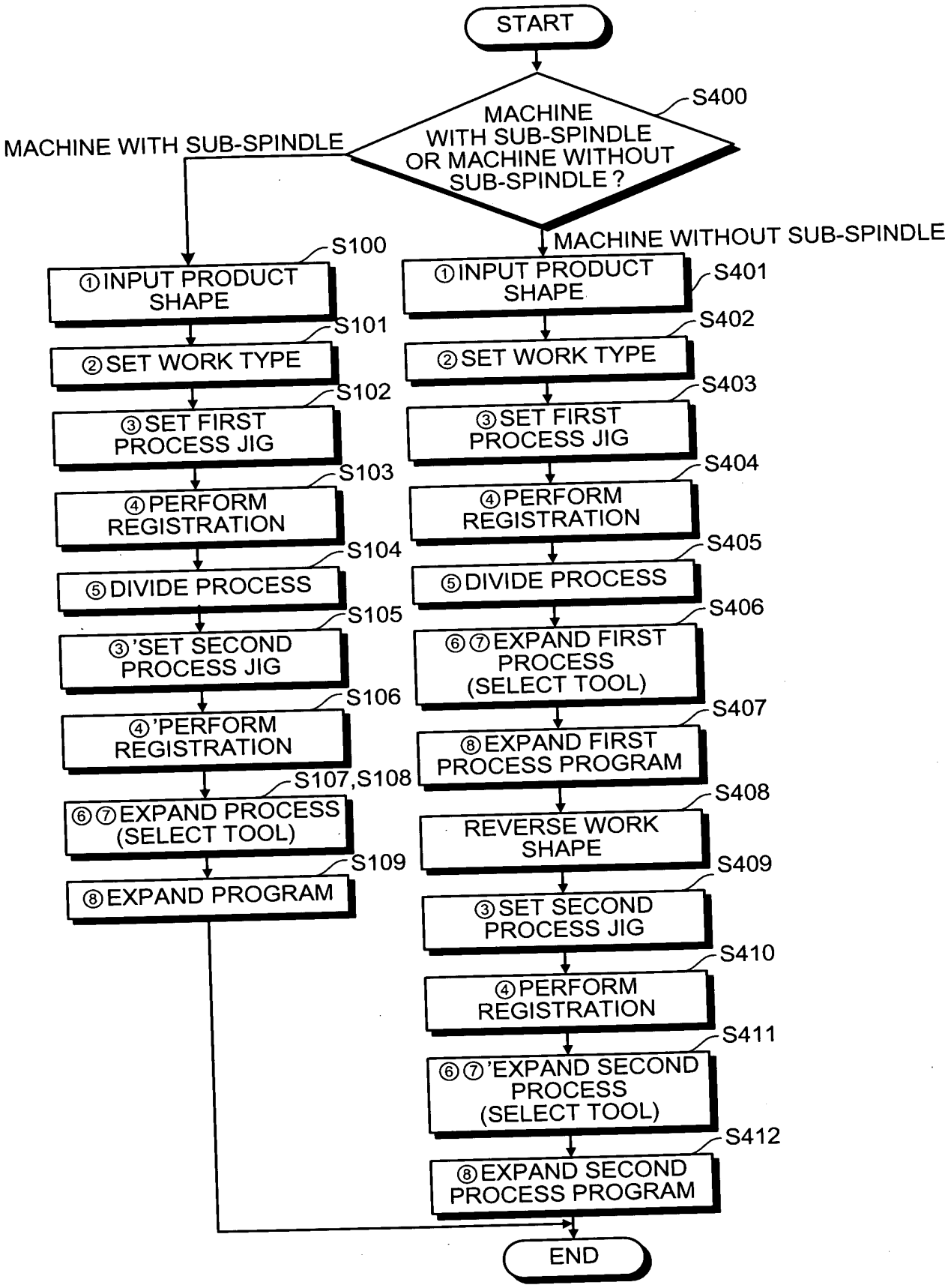

330
ONE-SPINDLE PROGRAM CREATING UNIT
340
DETERMINATION UNIT
331
TWO-SPINDLE PROGRAM CREATING UNIT

FIG.57


START
S400
MACHINE WITH SUB-SPINDLE OR MACHINE WITHOUT SUB-SPINDLE ?
MACHINE WITH SUB-SPINDLE
MACHINE WITHOUT SUB-SPINDLE
S100
①INPUT PRODUCT SHAPE
S101
②SET WORK TYPE
S102
③SET FIRST PROCESS JIG
S103
④PERFORM REGISTRATION
S104
⑤DIVIDE PROCESS
S105
③'SET SECOND PROCESS JIG
S106
④'PERFORM REGISTRATION
S107,S108
⑥⑦EXPAND PROCESS (SELECT TOOL)
S109
⑧EXPAND PROGRAM
S401
①INPUT PRODUCT SHAPE
S402
②SET WORK TYPE
S403
③SET FIRST PROCESS JIG
S404
④PERFORM REGISTRATION
S405
⑤DIVIDE PROCESS
S406
⑥⑦EXPAND FIRST PROCESS (SELECT TOOL)
S407
⑧EXPAND FIRST PROCESS PROGRAM
S408
REVERSE WORK SHAPE
S409
③SET SECOND PROCESS JIG
S410
④PERFORM REGISTRATION
S411
⑥⑦'EXPAND SECOND PROCESS (SELECT TOOL)
S412
⑧EXPAND SECOND PROCESS PROGRAM
END